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Vol. VIII. NEW YORK, AUGUST 28, 1886. No. 9.

THE activity in any department of commercial and industrial work may be fairly judged from the indications that are afforded by representative journals, and hence a man of capital or one seeking work, on looking around for some field of occupation, is always favorably impressed with the opportunities that suggest themselves on every page of such a paper as THE ELECTRICAL WORLD. While the average issue of this paper, running from 24 to 28 pages for weeks and months past, is an adequate exemplification of the extent to which it enjoys the esteem of readers and the confidence of advertisers, the present issue, with no fewer than 40 pages, marks high water so far, and tells the story of growth and prosperity in every part of the field of applied electricity. It is not our habit to boast; and when some time ago we increased the size of the regular issue from 20 to 24 pages, giving more reading-matter than any other electrical journal in the world, we did so without in any way calling attention to the fact, as we might fittingly have done. To-day the size of the issue, the variety of the contents, the beauty of the illustrations, and the number, size and wide scope of the advertisements, would naturally evoke the pleased comment, we think, of any one who has watched the development of electrical journalism in America. The paper, such as it is, has grown steadily on its merits, beginning humbly and gaining every step by hard work, as well as by the determination to say the true thing and do the square thing. The electrical business has expanded a little during the last ten years, and more during the last five, and the paper now keeps pace with, as it signalizes, the advance of electricity toward every sphere of investigation and application that science has pre-empted for it.

THE season of conventions and reunions is well upon us. This week we give full reports of the clambake of the year, of the meeting of the Old Timers, and of the meeting of the United States Military Telegraphers. Next week the electric light men gather for their pow-wow at Detroit, and then, the week following, the telephonists get together in St. Louis.

ONE notable feature going to indicate the stability of the electric light industry, is the great care with which central stations are now being designed and equipped so as to effect the generation of the current with the greatest economy and regularity. The steam or hydraulic engineer, as the case may be, and the mechanical engineer, are called in to aid the electrician in combining the most approved appliances. The illustrated description of the Brush station on another page shows what can be done in this way to insure good results.

THE Detroit meeting, next week, of the National Electric Light Association, promises to be one of the most successful held by that organization. We have already published the list of papers to be read, and that is an assurance in itself that the visit to Detroit will not be spent unprofitably. Moreover, the stronger the Association collectively, and the more active its members as a body, the greater will be the importance of the electric light industry in the eyes of every one, and individual members will thus be helped in their respective communities to get a hearing and to push their business. We trust that all in attendance at Detroit, as well as those who meet at the Telephone Convention in St. Louis a week later, will have an enjoyable reunion.

ARRANGEMENTS have been made with the Pullman Car Co. to furnish sleeping accommodations, from New York to Detroit and return, to delegates to the Electric Light Convention, for $3.00 for the round trip, provided enough members combine to take a whole car. As there is no difficulty in arriving at the latter result, it will probably be reached in time for the start of the Eastern members who go from New York. It is proposed by some of the Boston and Philadelphia delegates to rendezvous at New York for the journey to Detroit; while others will proceed from their respective localities as business and convenience dictate. As already stated by us, the round trip rate by the Erie road from New York City to Suspension Bridge is $13.50, and at that point delegates will have time to secure tickets for Detroit and return for $12, making $25.50 in all for the round trip from New York to Detroit.

WITH the facility now offered for travel, it is not strange that tourists and merchants, more than ever before, find themselves in countries of the language of which they are ignorant. While able to make their ordinary wants known, they frequently find difficulty in using the telegraph on account of their inability to communicate properly with the clerks. This seems to have been very properly taken cognizance of by M. Granet, the French Minister of Posts and Telegraphs, who is just now endeavoring to remedy the inconvenience cited above, so far as English-speaking travelers are concerned. M. Granet proposes to employ a number of English telegraph operators at the principal French offices, and to that end has been making overtures to the English telegraph authorities with a view to sending to England about twenty of the most intelligent French telegraphists in exchange for a similar number of English ones. The idea embodied here is not a bad one, and might with profit be extended so as to cover other countries.

AN arc lamp burning carbons of ordinary length, but having a life of several hundred hours, is a decided novelty, but, as will be seen from the description on another page, it has been realized in the form adopted by Dr. Eli C. Ohmart. The latter has taken up Sir Humphrey Davy's idea and brought it to a practical issue. While Davy sought to increase the life of his charcoal pencils by exhausting the air entirely from the inclosing globe, the present inventor removes only the active portion of the atmosphere, oxygen, leaving the inert nitrogen behind. The manner in which this is accomplished is quite simple, and the results already arrived at give promise of great usefulness for the lamp. An arc lamp of small candle-power which could be placed either on arc or incandescent circuits, and which would require attention only at long intervals, such as the one described, would undoubtedly find a large and ready application, while the arc-lamps of ordinary candle-power would have an enhanced value if the life of their carbons could be increased—a fact that requires no further demonstration. It is interesting to note that in this case the arc lamp is made to follow the course pursued in some cases in the construction of the incandescent lamp; with this difference, that in the present instances the arc lamp is periodically deprived of its oxygen, whereas the incandescent lamp, once made, remains without oxygen permanently.

INNUMERABLE have been the devices and processes employed for protecting iron from rust and its deteriorating effects, and while the prevailing method in vogue to-day is that of coating it with a layer of paint or similar preservative, another method, less extended in its use, is known. The latter consists in converting the surface of the iron into the magnetic oxide of iron. Russia sheet iron, known for its non-rusting properties, is so coated during the process of manufacture, and is in extensive use especially as the protection of the lagging of locomotive boilers and cylinders. For a long while this sheet-iron was the only form which was treated in this manner until of late the Bower-Barff process of treatment rendered it possible to give all forms of iron a coating of the same nature. These processes are carried out by the application of heat, but now M. de Meritens comes forward with a very simple method by which iron in any form or size can be given a firm and adherent coating of magnetic oxide in the electrolytic bath. With such a process available, every large iron-working establishment will be able to treat its products so as to make them indestructible from influences of the weather. The absence of heat in this process makes it particularly valuable for the treatment of steel. The announcement of the success of this process emphasizes the statement which we make in referring to the new process of electric welding, viz., that many establishments will, in the near future, count the dynamo as one of their most important "tools."

"ELECTRIC WELDING," a new art, has made its appearance, and will no doubt find a wide application in electricity and mechanics. The great benefits derivable from a method by which a practically continuous wire of any desired length may be obtained are especially of value to electrical constructors. Those engaged in the manufacture of dynamos know how troublesome the enlargement caused by the splice in a wire is. In the winding of field magnets the thickening of the wire at such points is a nuisance, and the projections frequently break through the insulation and finally develop into serious faults. With the aid of the new art it seems possible to join two wires so that the point of juncture is practically identical in size and texture with the remaining part. A remarkable fact in connection with this process is the readiness with which metals of different character can be made to weld. It would almost seem that the metals, when put in the "electrotonic" state by the passage of a current, are endowed with peculiar propensities for welding. It follows, then, that large pieces requiring to be welded would be benefited by having an electric current passed through them, even though the current alone would not be sufficient to generate a welding heat. As we have pointed out in another column, such is the experience of Mr. Elihu Thomson, the inventor of this process. It is quite within probability, therefore, that every large forging or rolling mill establishment will in the future be equipped with powerful dynamos for the purpose of generating currents to be sent through the metal during its process of manufacture.

REVIEWS OF NEW BOOKS.

LA PHOTOGRAPHIE DES DÉBUTANTS PROCÉDÉ NEGATIF ET POSITIF. Par Léon Vidal. Paris: Gauthier-Villars. 1886.

Photography has now become so popularized that it is more and more an adjunct to the drawing office work in large establishments. The advantages which a good photograph of an object or apparatus presents are too obvious to be further dwelt upon, and when practiced for mere pastime alone, photography affords much pleasure and develops artistic taste which many in the rush of business are apt to neglect. In the present volume the author describes in a very clear manner the various apparatus and processes for obtaining good negatives and prints. The book is an excellent work for beginners, and contains in small compass a large amount of information. It is neatly illustrated.

LA PHOTOGRAPHIE INSTANTANÉE, THÉORIE ET PRATIQUE. Par Albert Londe. Paris: Gauthier-Villars. 1886.

Instantaneous photography has opened up so many fields of research that a scientific discussion of the various methods and processes employed, together with the description of the apparatus, must be of interest to many at the present time. M. Londe, as director of the photographic service at the Salpêtrière Hospital in Paris, has given this subject his particular attention, and his results have led to the design of many original forms of apparatus, by which improved results in this delicate method of photography are obtained. The construction and operation of the quick shutter are given special consideration, and with it the study of the duration of the action of light in the case of short exposure. To this end Mr. Londe employs a tuning fork vibrated by electricity, for the purpose of measuring exactly the duration of the exposure, the best form of shutter, its position, and various other elements which bring about success in this field. The book embodies a large amount of valuable information on this subject and will prove of value to those interested therein.

The Ohmart Arc Lamp.

We have recently seen in operation an arc lamp which merits description, not only on account of the ingenuity

FIGS. 1 AND 2.—THE OHMART ARC LAMP.

displayed in its construction and operation, but also on account of the new phase which it may present in the growth of arc lighting. The inventor of the lamp, Dr. Eli C. Ohmart, has set out with the object of producing an arc lamp that can be safely burned in factories where combustible materials are worked, in mines, dye-works, stores and, in fact, in every situation where such a lamp must not throw off sparks.

But the most practical and important feature of the lamp is that by very simple means the life of the carbons is greatly increased over that which it now is in lamps of the usual construction.

To accomplish this object the entire mechanism of the lamp is contained within a hermetically sealed globe of glass and the carbons burn in an atmosphere of incombustible gas, such as nitrogen.

Instead, however, of supplying the nitrogen from a tank or refilling the lamps every time the carbons are replaced, a chemical is introduced which absorbs the carbonic oxide and other products of combustion, leaving pure nitrogen behind. For this purpose potassic hydrate, spongy palladium, quicklime, dimethylamine, carbon tetrachloride, etc., can be used.

Within a vacuum an arc light can indeed be produced, but owing to the absence of a sufficient number of gaseous atoms to be rendered incandscent by the heat of the arc, the light is insufficient. Nitrogen does not consume the carbon, but supplies the atoms which fill the arc and render more efficient the conversion of electrical energy into luminous, radiant energy.

With an alternating current the effect is better than with a continuous current for various reasons, but principally because with a continuous current the carbon particles are transported across the arc and deposited upon the other carbon in such a way that the ends of both carbons become blunt and flat. The alternating current

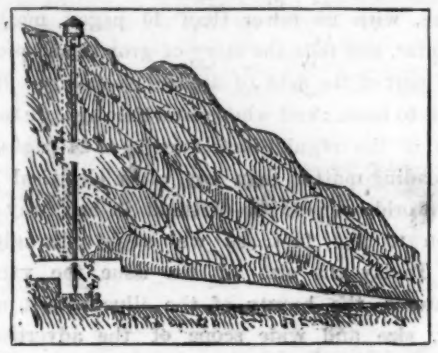


FIG. 1.—PHOTOGRAPHING MINE GALLERIES.

prevents this, but it can also be obviated when the continuous current is used, and has, indeed, been practically avoided by the method employed for feeding the carbons.

The mechanism, shown in detail in Fig. 2, feeds uniformly and continuously instead of by a series of short approaches. Dr. Ohmart states that when the arc is suddenly shortened, it momentarily sends more current through the helices, and the sudden increase or diminution of a current in a solenoid produces a reverse current which is the cause of polarization of the electrodes, and this is entirely prevented in the new lamp.

As stated above, the most practical and important feature of the lamp consists in the fact that it greatly lengthens the life of the carbon. In fact, in the lamps of usual candle power, Dr. Ohmart states that the carbon consumes or rather disintegrates at the rate of only 1 inch per one hundred hours. This evidently means not only a great saving in carbon, but also in cost of attendance, trimming, etc. In fact, this lamp, which burns steadily, might be placed upon circuit, and would require looking after but once a month, or as little as an incandescent. The lamp has been in successful operation in Boston for a month past.

We may add that thin carbons giving arcs of small candle-power can be employed, so that for interiors the long duration of the carbons would make an arc lamp of this character well adapted and preferable.

A New Treatment for Incandescent Lamp Filaments.

A process lately devised by M. Alexander de Lodyguine, of Paris, is said to give great toughness to the filaments of incandescent lamps, and hence increases their life materially. In this method, fluoride of boron and its derivatives are used for the purpose of dehydrating organic substances which contain the elements of water chemically combined therewith.

The carbon filaments are subjected to the action of fluoride of boron ($B\ Fl_3$), and as the reaction takes place while the substances are cold, it is not necessary to raise the temperature. After this treatment the substance is subjected to high temperature with exclusion of air and oxygen, to eliminate the fluoride of boron in excess, as well as the combinations which it may form. This operation may be conducted in any ordinary or suitable way, as in a closed muffle or retort, the heat being derived from a furnace, from an electric current, or otherwise. The carbon thus prepared is impregnated with a carburet of hydrogen, such as sugar or glucose, or analogous substance containing in combination the elements of water ($C^mH^{2n}O^n$). After this, the carbon is again treated with fluoride of boron and acted upon by heat, as before, and these operations are repeated until the required density and conductivity are attained. The method has been patented in this country.

The Electric Light Underground.

Three of the Aqueduct Commissioners began this week, says the New York *Mail and Express*, an inspection of the work done so far on the long tunnel between here and Croton. They appear to have gone into the matter thoroughly, for they went under ground into all the shafts they visited, and looked at the work closely. In one shaft they had an experience that may lead them to take some action looking to the more perfect protection of life. It was one of those in which electric lights are not used, and one of the gasoline lamps exploded, causing them much inconvenience, and putting them temporarily into a position of some danger.

This practical demonstration of the unsafe character of the illuminators used by one large firm of contractors ought to be enough to spur the Commissioners up to the point of demanding that proper precautions be taken against explosions. The chief engineer of the aqueduct has called upon this firm frequently to use electric lights as the others do; and has finally asked the Corporation counsel for an opinion as to the power of the Commission to force the contractors to use such lights.

A Huge Lightning Conductor.

Most of our readers are probably aware that one of the principal features of the exhibition which is to be held in Paris in 1889 is to be a tower constructed of steel and 300 metres in height. The question of protecting the tower from the effects of lightning has been considered by a small committee of French electricians, and they have just presented their report to the Minister of Commerce. They point out that the tower itself, being constructed wholly of metal, will play the part of a gigantic conductor, and will serve to protect a very large space around its base. But in order that its action may be efficient it will be necessary to take great care to make thoroughly good metallic connection with the subsoil, at a depth sufficient to ensure the presence of moisture all the year round, If this be properly done the interior of the tower will be absolutely safe during the most severe electrical disturbance of the atmosphere. The earth plates are to be of copper, and they will be connected to each angle at the base of the tower by substantial copper cables. The summit of the tower itself is to be surmounted by a tall copper rod having a gilded point, and supplementary conductors are also to project from the angles of the building near the summit; but these rods are merely attached to the walls of the tower, and will not be continued to the ground as in ordinary cases.

Photographing an Inaccessible Mine Gallery.

Distressing mine accidents are now so frequent that every means which can be brought into requisition to alleviate the suffering or determine the exact condition of the victims, deserves careful attention.

At Chancelade, near Périgueux, France, lately, there occurred a mine accident by which five men were imprisoned, and strenuous efforts were made for their rescue. A relief well was sunk from the top of the hill, as shown in Fig. 1.

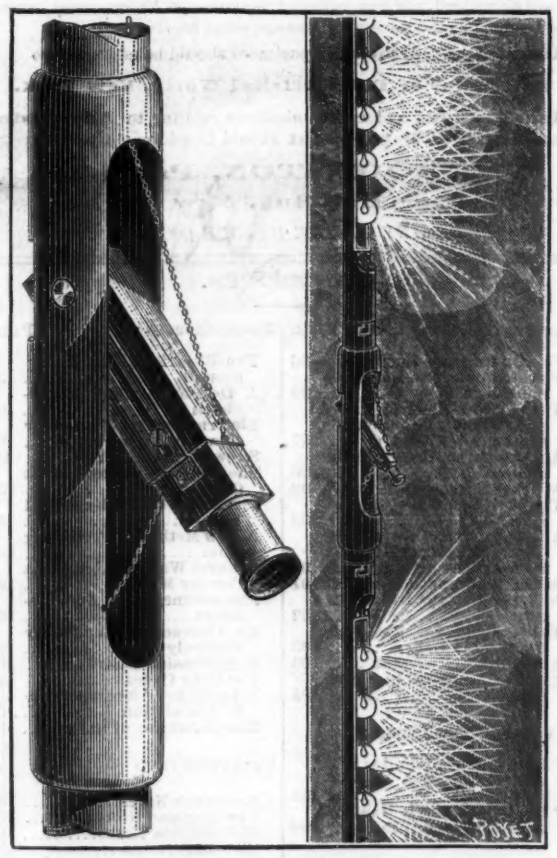


FIG. 2.—PHOTOGRAPHING MINE GALLERIES.

It had a diameter of 0.3 metre and a depth of 70 metres. But the well, unfortunately, did not pierce an accessible gallery. In order to determine, however, the exact state of things in the mine, it was decided to photograph the interior, and for that purpose an ingenious photographic apparatus was designed by M. Langlois, of Paris. The apparatus, as it appears in the mine and in enlarged view, is shown in Fig. 2, for which we are indebted to *La Nature*. As will be seen, the camera is pivoted at one end within a metallic case, and above and below are placed a number of incandescent lamps that can be lit and extinguished by means of a switch from above. The camera can be pointed at any angle by means of the chain which communicates with the surface, and in this way different views can be taken.

At the top of the well, a dark room, *C*, was built, so that the sensitive plate was not affected, and the apparatus was lowered with the lamps extinguished. After arriving at the bottom, the lamps were switched on and the plate in the camera was thus exposed to the light and to the surrounding objects.

In this manner a number of different views were ob-

tained of the interior of the mine, one of them showing the corpse of a workman, and settling all doubt as to the fate of those who had been imprisoned by the accident.

The Brush Electric Light and Power Company's Station, of Cleveland, O.

But a few years ago, starting out in many cases with power rented, electric light stations rapidly sprang up everywhere and grew, until now they rank with the most complete power installations in the country. An electric light station may be looked upon as a plant for the conversion of one kind of power into another form, and as such, its internal equipment requires special arrangement to bring about this conversion economically and with the least chance of interruption.

One of the model stations in this respect is that of the Brush Electric Light and Power Company, of Cleveland, O., the equipment of which is of the highest excellence from the stand-point both of the engineer and the electrician. The building itself has been located in such a position that the cost of handling coal is reduced to a minimum, while its proximity to the water permits of additional engine economy. Situated at the foot of South Water street, the building stands between the Valley Railroad on the front and the Cuyahoga River on the rear, and is very near the C., C., C. & I. Railroad.

The station building is constructed of brick, 121 feet × 108, and has two stories, each 16 feet high. The boiler room is 65 feet × 48, and is 22 feet high, while the dynamo and engine rooms each cover the large space of 95 feet × 108.

Beginning with the original source of power, the coal is delivered in front of the station on a special track in carloads, and is dumped into the boiler room with a bucket worked on a tramway overhead, so that the cars may be unloaded at any place in front of the building. All valves and boiler appliances are in the boiler room, and are operated by the firemen, who run a battery of five boilers, each having the Scofield high and low water alarm gauge and an Ashcroft steam gauge attached. Each boiler can be operated independently, or all can work together, as desired. One of the Peerless recording steam gauges connecting to each boiler is placed in the office and shows how the steam has been running each night.

The engine-room adjoining the boiler-room contains the following engines: One 24 × 48 in. Reynolds-Corliss; one 20 × 36 in. Wright; one 16 × 36 in. Wright; one 10 × 12 in. Ball high speed; one 9 × 12 in. Ball high speed. These engines are all of the automatic cut-off type and are so arranged that they can be run either non-condensing or condensing. When employed in the latter manner, the exhaust is connected to three large Worthington condensers placed at the river water-line near the engines. The latter are all belted to a line of shafting, 106 feet long carrying 26 friction clutch pulleys of the Hill taper sleeve pattern.

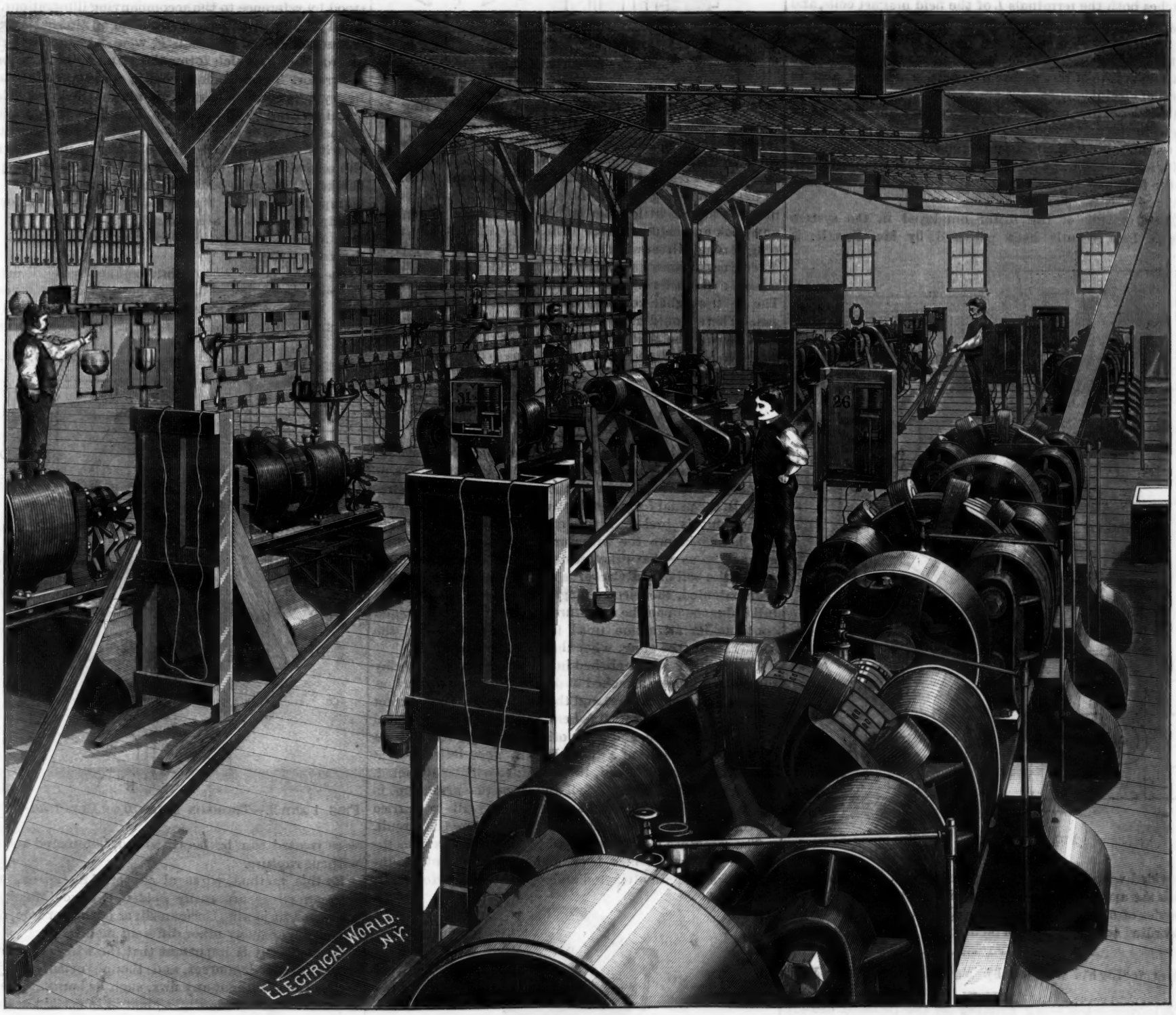
These pulleys belt directly to the dynamos situated in the dynamo room on the floor above and illustrated in the accompanying engraving. The machines are arranged in two rows, 12 feet apart, so that the attendant can see all his machines at once, and has in his reach levers which will disengage any clutch pulley. He can, therefore, stop or start any machine at any time he so desires. He can also control the engines as well from this floor, and connect the whole plant together by the use of the Hill friction clutch coupling, situated on each section of shafting. One very good feature of the pulley consists in the fact that when the clutch is thrown out, the friction ceases entirely, and the pulley stops, at no time heating its friction surfaces.

The switch-board, situated in the centre of the dynamo-room, is fitted with ammeters, current-indicators, lightning arresters and spring-jacks of peculiar make and construction on each circuit. Each machine is so arranged that at any time its condition of working may be determined by a glance at the switch-board.

As our engraving shows, a system of piping is connected to the bearings of all the dynamos, and it also extends to all the engine and shafting bearings in the station. By this means, continuous lubrication is maintained for all the bearings, and the rate at which each is fed can be regulated at will. The oil, after passing through the bearings (should there be any surplus), is caught up, filtered and then pumped into a tank, where it is used as often as it can be, or until it is worn out and disappears, new oil being added from time to time, as needed. With this system of oiling, a little less than 3 pints of oil has lubricated about 60 large dynamo and shafting bearings in this station.

All repairs of any of the apparatus are made in the station by skilled men. The office is situated in the front of the building off the dynamo room, which has glass sliding windows all around it, thus placing the work under control of the officers at all times. The office is lighted by the Swan incandescent light, and is connected by telephone with different parts of the city. The present capacity of the station is about 1,200 lights, which can be easily increased from time to time, as the business may require.

It would be difficult to single out any particular part of this station as possessing greater merit than another, for the whole is arranged with so much skill and foresight that it may well be regarded as a model upon which to base the construction of contemplated electric light stations.



DYNAMO ROOM, BRUSH ELECTRIC LIGHT STATION, CLEVELAND, O.

A Decision Against Bucket-Shops.

A Louisville judge, who recently had a bucket-shop case before him, decided that bucket-shop operations were gambling in every sense of the term. The decision was rendered in the case of J. W. Lyons *vs.* Thomas J. Hogden and Isaac P. Miller, operating the Louisville Cotton, Grain and Produce Exchange at No. 401 West Main street. The plaintiff complained that in various deals with this company in the last five years he had lost $1,600, for which he brought suit. The defendants demurred to the petition, and on the demurrer the decision was rendered. The opinion recited the law in full upon the question, and after quoting from various statutes and decisions of the Appellate Court, concluded thus: "It was also much urged in argument that 'bucket-shop' gambling was not within the statute, becauses the losses cannot be said to occur 'at

any other time or within twenty-four hours.' I am unable to concur in this reasoning. It seems to me that such losses occur 'at one time,' and that that time is when the 'deal' is closed. The exact period of the loss is much easier fixed than in a long and continued game of cards, in which gains and losses vary, and are only adjusted finally when the game closes. For these reasons the demurrer of the defendant is overruled."

An Automatic Electric Motor System.

The varying loads which in practice are thrown upon an electric motor driving a number of machines, require that some provision be made for keeping the speed constant under each change of condition. Mr. John Beattie, Jr., of Westport, Mass., in solving the problem employs a motor whose field magnets are provided with several independent coils upon each leg, as shown at *C*, Fig. 1, of the accompanying illustration. Geared to the motor there is a governor *D*, which oscillates a lever *K'* having a circular rack *M* at its extremity. The latter swings a lever *K*, which touches both the terminals *L* of the field magnet coils, and those of a corresponding number of resistance coils *I*, at *L'*. The lever *K*, as shown, is in series with one or more of the field magnet coils which are in parallel circuit and with one more of the resistance coils, which are also in parallel circuit.

It will now be readily understood that any increase of speed in the motor operates so as to cause the substitution of one or more of the resistance coils for a like number of field magnet coils. This of course reduces the strength of the field and reduces the speed of the motor to its normal amount.

The armature of the motor employed in the system which has recently been patented by Mr. Beattie, is

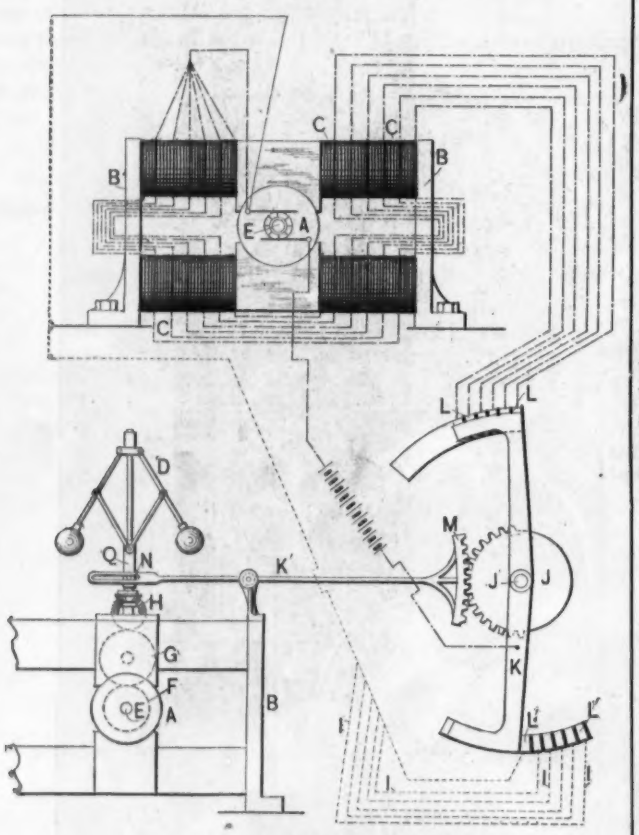


FIG. 1.—BEATTIE MOTOR.

provided with two sets of grooves, Fig. 2, *P*, *P'*, parallel with the armature shaft, and at right angles to these run a series of deep annular grooves, *Q*. The wires are wound according to the method of Siemens.

Electric Lights Wanted by New York Business Men.

A movement is being agitated by the produce dealers doing business west of Broadway between Harrison and Liberty streets, to get the Aldermen to pass a resolution authorizing the lighting of the lower part of the city with electric lights.

"There are many good reasons why this should be done," said G. S. Palmer, a produce dealer at No. 166 Reade street, to a *Tribune* reporter recently. "In the first place, it would be a great preventive of crime. As it is now, most of the streets are dimly lighted, and strangers, coming across the Liberty street ferry and not knowing that Cortlandt street is lighted, go up Liberty street, which is dark. It is the very place to be chosen by highway robbers and pickpockets, and if there was a better light in the streets pedestrians would be comparatively safe at all hours of the night. This is by no means the only important point in favor of the electric lights. While the majority of the people in New York are asleep, there is going on one of the largest branches of trade—the purchase of produce worth thousands of dollars. Farmers and truckgrowers come in from the country, and from midnight until after daylight their wagons fill the streets around Washington Market. Money changes hands under the dim light of a faintly flickering gas jet. Often grievous mistakes occur, which with better light would never take place. Go through this section any morning about 2 o'clock, and you will find the seller and buyer trying to come to some agreement over the price of a wagon-load of garden truck. On account of the imperfect light, the commission merchant cannot detect the bad parts of the load, and he frequently finds himself with decayed fruit or vegetables; while on the other hand, he cannot see whether the vegetables are better in quality than others that he may buy, and, of course, he will not pay what they are actually worth.

"Hardly a night passes that the police in the Twenty-

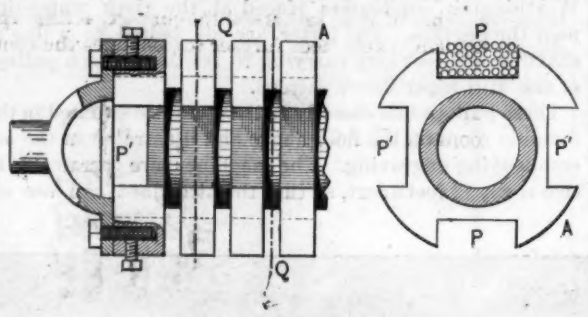


FIG. 2.—BEATTIE MOTOR.

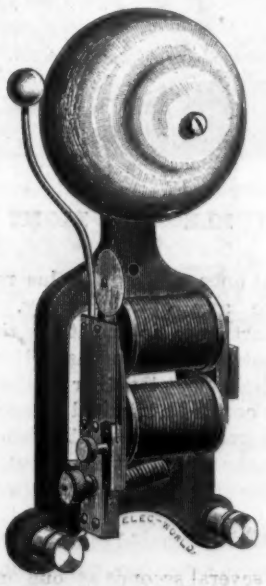
seventh Precinct do not have cases of petty pilfering by sneak-thieves reported to them. It is an easy matter for a thief to carry off a basket of vegetables or eggs, and many times live poultry are taken from the crates that they come in. The electric light would also be of material assistance to the firemen in getting to fires. Because the streets are narrow, there is little room left for the passage of engines and hook and ladder trucks. The other night, while running through Greenwich street to a fire in Cortlandt street, an engine ran into a farmer's wagon, taking off one of the wheels and scattering the vegetables around the street. The electric lights would be as cheap in the long run as gas. There would not have to be more than one light to a block, and the police force in the lower part of the city could be lessened and the money thus saved would be a gain to the city."

A Novel Electric Bell.

A novel and interesting form of vibrating electric bell, which has recently been designed by Mr. Elliot Carhart, of Brooklyn, N. Y., is shown in the accompanying illustration. In the usual form of vibrating bells, as is well known, the circuit is broken before the striker touches the bell, and hence before the armature approaches the electro-magnet, so as to have the greatest influence exerted upon it. In the bell of Mr. Carhart's design, which has recently been patented, the electro-magnet is allowed to exert its full influence upon the armature carrying the striker, and continue its attraction until the instant at which the striker meets the gong, when the circuit is broken.

This result is accomplished in a very simple manner by means of a tongue attached at one end to the armature, as shown in the engraving, and through which the current is made to pass. At its fixed end the tongue is insulated from the armature, and at its other, free end, it carries a weight in the shape of a disc. It will now be seen that when the circuit is closed, the armature will be attracted, and as the striker hits the bell and stops the armature in its motion, the disc-weight and tongue will be carried further by their momentum, and thus rupture the circuit.

The armature is then retracted by the spring, and as the weighted tongue comes back and re-makes contact, the armature is again attracted and operates as before. By



THE CARHART BELL.

these means a good ring is obtained, which can be regulated so as to include a wide range of beats per second. The object of making the weight upon the tongue in the shape of a slightly concave disc, is to take advantage of the cushioning effect of the air presented to the enlarged surface.

The New Art of Welding by Electricity.

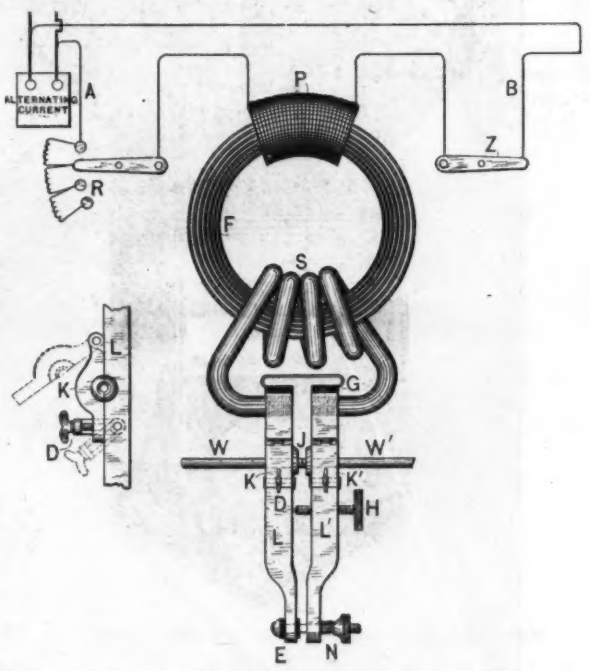
One of the most ingenious and widely applicable uses to which electricity can be applied is that recently brought out by Prof. Elihu Thomson, the well-known electrician of the Thomson-Houston Electric Company. Heretofore, the manner in which joints have been made between two pieces of metal, especially if in the wire form, was such as to leave the joint thicker and out of symmetry with the other part of the piece.

With the object of overcoming this difficulty and to secure a good joint between wires without the application of solder, and to obtain an actual weld between two abutting ends, Mr. Thomson employs the electric current to excellent advantage.

Briefly stated, the new art of "electric welding" consists in bringing together the ends of the wires or bars, etc., to be joined and then constituting the abutted ends and a slight portion of the wire or bar on each side of the joint as the path for an electric current of great volume.

The manner in which this idea is put into practical operation is extremely simple and will be readily understood by reference to the accompanying illustrations, Figs. 1 and 2. As will be seen, wires from an alternating source of current are led to a coil, *P*, wound around one side of an iron ring *F*, which forms the primary of a secondary generator. The secondary coil, *S*, consists of a few turns of heavy copper cable having an almost inappreciable electrical resistance. A resistance, *R*, is placed in circuit with the primary so as to vary the strength of the current, and a switch, *Z*, permits of rupturing it at will. The ends of the secondary coil are attached each to one of a pair of blocks, *L*, *L'*, of good conducting metal, which carry clamps for holding the wires in position, and for rapid manipulation they are hinged, as shown in Fig. 2. A nut, *N*, and a compressed spring permit the arms to be drawn together.

The wires being brought into contact by gentle pressure, the current is allowed to pass, the ends of the wires fuse, and, being pressed together, form a perfect welded joint, which is nearly uniform in texture with the rest; and the



FIGS. 1 AND 2.—THOMSON METHOD OF ELECTRIC WELDING.

wire treated can be bent, twisted, hammered and drawn without rupture.

By this method, wires of copper, brass, iron, steel or German silver are easily welded, and no difficulty is experienced in joining German silver to steel or iron, or brass with iron, or many other different metals.

Of course, it is important that the wires shall be clean to insure good contact, and though usually the joint is well formed without any flux, such as borax, there is no objection to its use in slight amount in certain cases.

The advantages which this method of welding presents over the usual manner of jointing must be evident. It enables the accomplishment in an easy manner of what was before very difficult or impracticable.

This method of welding is not confined to the electrical art alone, but promises to be of great benefit in the mechanic arts in general. By its means, chain links, rings, etc., can be easily welded, and the wires composing endless iron and steel cables can be joined without splicing, leaving the cable of uniform section throughout. Any wire can evidently be made practically of any length and without a perceptible joint. The invention also presents a great advantage in joining the ends of steel band saws, permitting the formation of joints without heating the metal to any considerable distance on each side of the joint, so that temper, elasticity and finish remain uninjured. Other applications will readily suggest themselves, and the invention must be looked upon as one of the most important of the recent applications of electricity.

From the easy manner in which even heterogeneous metals are joined by this process, it would appear that the passage of the current in the presence of heat puts the metal in a peculiarly favorable condition, so that it welds easily. Hence Mr. Thomson proposes, in the case of large

pieces, where the current alone would be insufficient to engender a welding heat, to heat the pieces additionally by external means, the presence of the current acting so as to make the weld more perfect.

A New System of Regulating Clocks Electrically from a Distance.

Since the production of an electric clock by Wheatstone in 1840, and at different times by Appold, Bain and Shepherd, numerous devices have been invented for the purpose of moving clockwork by electricity, by seizing the hands, or the arbors carrying the hands, and moving them to a correct point at regular intervals; and in many cities of America and Europe these devices have been introduced. Of what are now termed "electric time" devices, or devices which depend upon a current from a master clock for their movements, the number is large and increasing; in fact, scarcely a month passes which does not witness a new form patented in this country alone. In the majority of systems of this description, when the connecting wire breaks the subsidiary clocks are necessarily inoperative, and if, from any cause, one of the impulses from the master clock fails to reach a dial, it means the loss of a minute in the indicated time.

There are likewise many forms of instruments for synchronizing time-pieces by moving the hands at long intervals to a correct point. All are of merit as far as they go, and are superior to electric clocks or dials, because they

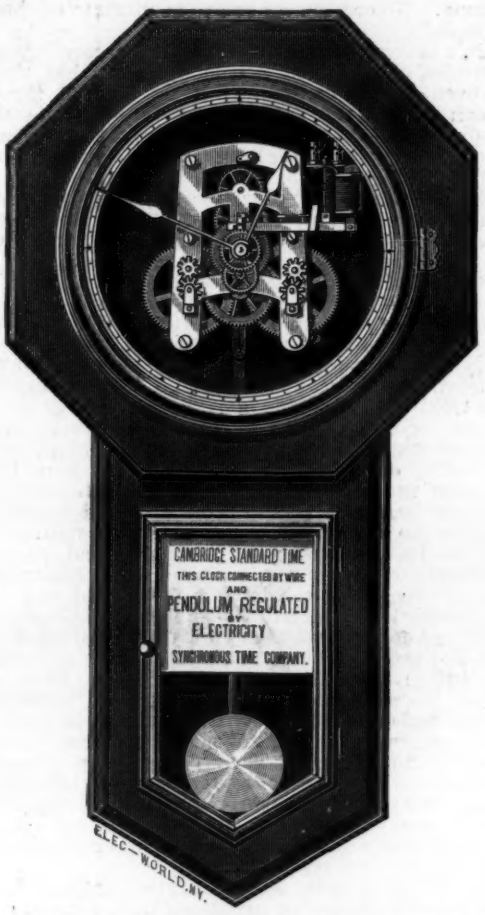


FIG. 2.—REGULATING DEVICE—SYNCHRONOUS TIME SYSTEM.

are generally applied to mechanical clocks, which will continue to run without reference to the connecting wire as long as they are kept wound up. The time indicated by either of the above systems is, however, correct only at the instant when the hands are set, as the running rate of the clock remains unchanged, and whatever error there may be constantly increases as regards the indicated time, until the next instant of correction, when it frequently happens that an instantaneous movement of the hands is made, covering the indicated time of several minutes; and as this occurs during every interval between the hand-setting periods, it is thought by many to be an unreliable plan should the rate of the clock be much in error. It is unnecessary to enlarge upon these points to those who are conversant with the principles of the regulation of time-pieces.

The regulation of clocks or watches is ordinarily effected by changing the centre of oscillation, or, to speak more plainly, by changing the length of the pendulum between the centre of its swing and the bottom, or by changing the length, and consequently the tension, of the balance spring.

Until the introduction of the system of the Synchronous Time Company (whose name, by the way, is not a correct expression of its purposes), under the patents of Messrs. Millard, Clarke and Eastman, no devices looking to the regulation of clocks from a distance or otherwise than the ordinary mechanical devices have been known. In fact, so wholly novel is this system, that it is said that not a reference was made to any other system by the Patent Office, thus assuring a ground patent for changing the centre of oscillation of clocks and the regulating spring of marine clocks and watches from a distant point by any means, electrical or mechanical, and opening up an entirely new field of operation.

The aim of the system is to control the pendulum and through it, by simple means, change the rate; in a word, to effect electrically from a central point the result which has hitherto been effected manually in regulating through the pendulum or tension of the spring. It comprises a correct standard clock, and a wire leading from this to any number of subsidiary clocks of any manufacture at whatever distance they may be placed, whether one mile or a hundred. Over the wire one electrical impulse of less than a second's duration is sent periodically, at hourly intervals or longer. Each subsidiary clock is provided with an attachment so constructed that the impulse thus transmitted has no effect if the time indicated is correct, while if it be incorrect, the current, acting upon the mechanism explained further on, changes the centre

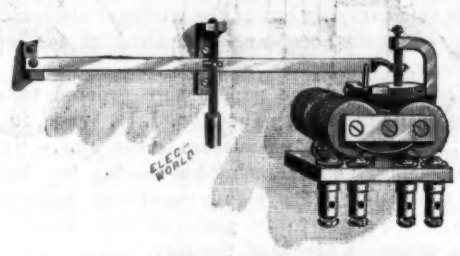


FIG. 1.—ORIGINAL FORM OF REGULATING APPARATUS.

of oscillation of the pendulum or the tension of the spring and corrects the running rate.

The regulating device shown in Fig. 1 is the first form adopted for use by the company, and will most clearly indicate the principle involved. It is in circuit less than a minute before and after the instant when a current is received from a master clock. One electric impulse is sent over a wire from the master clock hourly, or at any desired interval. By simple means, according as the clock in which the device is placed is fast or slow, the current is compelled to pass through one pair of coils or the other. The toothed wheel is turned one step to the right or left by pawls on the post above the armature, according as the armature is attracted toward either pair of coils. The upright screw is turned with the wheel, and in turning moves the nut up or down, which raises or lowers the end of the arm, and consequently slides the two pins up or down the suspension spring, thus regulating the length of the swinging portion of the pendulum.

The device shown in Fig. 2, in which only one electromagnet is used, is a modification of the first apparatus. The direction in which the regulating screw shall turn is determined by a pointed finger which engages an arm moved toward it when the current attracts the armature, and by means of a sliding attachment upon the arm causes a toothed wheel to turn one step to the right or left, with the result exhibited in the previous illustration. This form is somewhat more complicated than that first shown, but will probably be more generally adopted, as no electrical knowledge is required to connect it in circuit other than to be able to make a joint for the incoming and outgoing wires.

By its mechanical motion, this form can change the

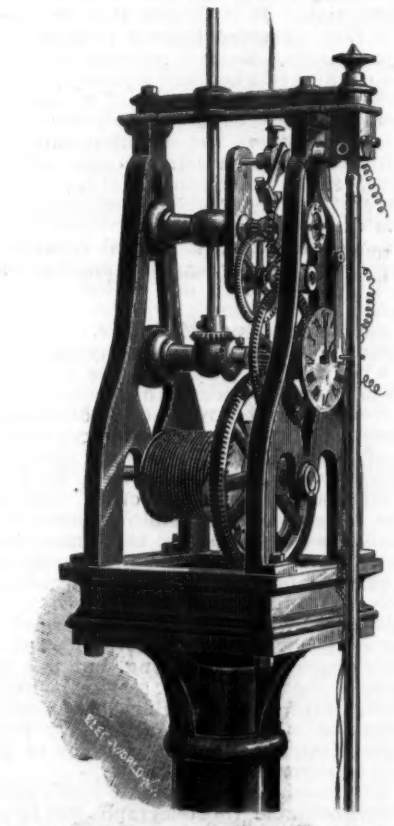


FIG. 3.—TOWER CLOCK—SYNCHRONOUS TIME SYSTEM.

second-hand several seconds at one impulse if required, which may be of advantage in showing time by seconds, because changes in an observatory clock are sometimes made several seconds at once in correction of accumulated errors and by this means can be followed implicitly at the next regulating impulse, the rate of the clock remaining substantially the same.

The marked difference between this system and those in which hand-setting devices are employed, is obvious.

Fig. 3 shows its application to a tower clock and Fig. 4 to a regulator.

The office of the company, of which Mr. J. W. Duxbury is president and general manager, is at No. 4, Herald Building, Boston, where the complete system is shown in operation. Arrangements have already been made for the operation of the system in Boston, Providence, Worcester and several smaller cities in New England, and upon some of the principal railroads in that portion of the country. Negotiations are in progress for a number of the larger cities in the United States, in one or two instances with especial reference to the use of telephone lines for this purpose, as it has been found by actual work that the system can be used upon these lines without detriment and without change in the apparatus in either the telephone or the time system.

Subway Material Tests.

In accordance with notice given, Dr. Albert R. Ledoux, the expert of the Electrical Subway Commission, tested various samples of asphaltic concrete on the 19th inst. at the Fairbanks Testing Works, No. 84 Thomas street. Subway Commissioners Hess and Moss, Mr. Dorsett and his partner, Mr. J. R. Burdick; Chief Engineer F. Collingwood, of the New York and Brooklyn Bridge; Osborn Macdaniel, of the Comptroller's office; Messrs. W. O. Callender, of the Callender Cable Company; A. M. Rice, of the Gates Iron Works, Chicago; M. Gabriel and H. Schall, importers of the Brunswick asphalt, and Herman Poole and J. G. Tail, of the Mica Roofing Company, were present during the

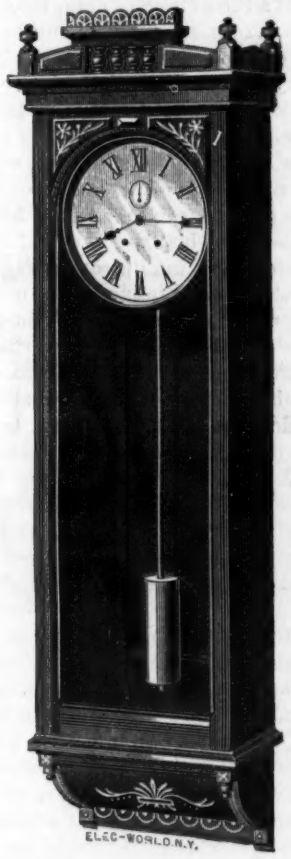


FIG. 4.—REGULATOR—SYNCHRONOUS TIME SYSTEM.

testing. The samples of asphalt submitted were prisms 6 in.x6 in.x30 in. Mr. Ohlsen assisted Dr. Ledoux in the work. The prisms were on supports 3 inches wide and the pressure plate was 3½ inches wide.

The first tests made were as to the tensile strength of the samples, as follows:

Barber Asphalt Company, one sample broke at a pressure of 122 pounds to the square inch, another sample broke at 263 pounds, there being 1 inch deflection before breaking; Henry Bolze's sample stood a pressure of 117 pounds to the square inch; sample No. 1. of the Ferroid material, an iron "matte" with uneven texture, stood 44 pounds to the square inch, and sample No. 2 stood 131 pounds; Dorsett Company, sample No. 1 at 105 pounds to the square inch, and sample No. 2, 124 pounds to the square inch: Neuchatel asphalt, sample No. 1, 111 pounds to the square inch; sample No. 2, 142 pounds to the square inch, ½ inch deflection before breaking; New York Mastic Company, sample No. 1, 133 pounds to the square inch, and sample No. 2, 115 pounds to the square inch, 1½ inches deflection before breaking.

Tests were then made as to the crushing strength of the material. The samples of conduits broke under pressure per square inch as follows:

Dorsett No. 1, 4,625 lbs.; No. 2, 5,027 lbs.; Venezuela, 3,773 lbs.; Neuchatel No. 1, 1,225 lbs.; No. 2, 2,432 lbs.; New York Mastic No. 1, 925 lbs; No. 2, 5,177 lbs.; No. 3, 3,900 lbs.; No. 4, 3,612 lbs.; Barber No. 1, 890 lbs.; No. 2, 967 lbs.; No. 3, 1,650 lbs.; No. 4, 1,617 lbs.; Bolze No. 1, 810 lbs.; No. 2, 790 lbs.; Poole, 5,562 lbs.; McIntyre, 3,082 lbs. A piece of broken Dorsett conduit resisted 59,200 lbs. crushing pressure. A rectangular prism of the Dorsett conduit with 10 ducts broke at a pressure of 12,280 lbs. One sample of the Barber Asphaltic Company conduit with four ducts stood a pressure of 1,850 lbs., and the second sample broke at a pressure of 4,960 lbs. The conduit

deflected one inch before breaking. Richardson's sample of conduit, a round pipe made of cement with four ducts, broke under a pressure of 91 lbs. to the square inch.

Dr. Ledoux remarked after the tests had been made that he would make a report on the subject to the Subway Commissioners at their next meeting, He thought the tests had been eminently satisfactory. Inspectors have been appointed by direction of Commissioner Flower to supervise the construction of the conduits at the Dorsett works in this city.

One of the latest moves in connection with the subway matters has been the resignation of President Fitzhugh, of the Construction Company, on the ground of pressure of other work. No other president has yet been elected in his stead. Meantime, arrangements for the work advance, and the contract for excavating on Sixth Avenue has been awarded to Mr. John D. Crimmins. No trouble is now anticipated in beginning the operations. On Tuesday, the 24th, at the meeting of the Subway Commission, Lieut. E. A. Benjamin was appointed General Inspector of the conduits at $3 a day, with Thomas A. Ryan and Patrick Walsh as Assistant Inspectors. The commission adjourned subject to the call of the chair.

The Telegraphic Reunion at Cleveland.

The Old Timers' Telegraph Association and the United States Military Telegraph Corps held their annual reunion at Cleveland, O., on the 18th inst., at the Board of Trade rooms. The attendance was very large. The meeting of the Old Timers was called to order at 10:45 A. M., President J. D. Reid in the chair. The proceedings opened with an eloquent address by Mr. Reid, in which he said: "The telegraph, from its first invention, has been to me a source of constant fascination. I wear upon my breast to-day the likeness of Professor Morse, taken at a time when he was in the midst of his early struggles, and which for more than forty years was worn upon the bosom of his eldest daughter, whose sad death has been so recently recorded. I am proud that my first connection with the telegraph made me his friend. Men have tried to take away his crown, but it is yet upon his brow. In his serene and intelligent society I have found some of the most powerful influences of my life. He was less an inventor than a man. He had the bearing which surrounded him with the worthiest and best of men. He made no claim which was not truly his own. To me his memory is very sweet and dear and governing. I glory in the thought that he made me his friend. On my own connection with the telegraph I shall not enlarge. I believe myself to have been the only person who has learned to telegraph without the aid of and before seeing its mechanism. I was, I think, the first to open a commercial telegraph office. I was the first regularly appointed superintendent. I was the first to erect iron wire as a conductor, and I know I was the only man who ever covered it and myself with tar. I was the first to originate a lightning protector, receiving a silver medal therefor from the Franklin Institute of Philadelphia, and which to-day forms the basis of a company with large capital in which I have no share. I was the first, in connection with Mr. David Brooks, to use cotton cloth and beeswax as an insulator, which became a good feeder of bees, but did not help insulation. I inaugurated the first telegraphic revenues on a commercial line by sending names at six cents apiece. I had printed the first tariff circular and the first tariff check sheet, and I was the first superintendent who, acting as general manager, reported money enough as a residue of six months' business from the opening of the line for a dividend of five per cent. It is one of the curious circumstances of the early history of the telegraph that for some years I was superintendent for five companies at the same time and had neither clerk nor assistant."

Mr. C. C. Hine, editor of the *Insurance Monitor*, then read a very interesting and gossipy paper on "Personal Reminiscences of Early Telegraphy in America." His experience dates back to 1845–6. In 1847 he received the appointment of "assistant operator" at Detroit. Then: "In the summer of 1847 I received an invitation to 'go West,' and, embarking on what we used to call an 'upper laker,' proceeded through Lake Huron and the Straits of Michilimackinac, down Lake Michigan to Chicago, then a town of 16,000 inhabitants. There was not at that date a locomotive in the State of Illinois nor one west of there on the continent; there was but one telegraph wire in Chicago, one which had recently been stretched into it from the East. The proper thing for a passenger going south to do was to embark on a canal boat, which I did, and in due course of time reached the head waters of the navigable part of the Illinois River at Peru, where I again shipped on a small stern wheeler, one of the sort which "runs on a heavy dew" (one of the kind which I have actually seen floated off, when aground, by the hands getting overboard and prying her off with planks and hand spikes). I arrived in Peoria on the fourth day of July, 1847. There I met the first wire which was ever stretched north and south through the State of Illinois. This was the beginning of the line known as the "Illinois and Mississippi" of which Judge Caton was for many years the leading spirit. It was built by Charles G. Oslere, of whom I still preserve at my home in New Jersey an old-fashioned daguerreotype. Oslere and I were warm friends, although he was much my senior. The California fever was just then becoming prevalent, and I wanted to go if I could not get a situation in the St. Louis office, to which I was aspiring. Oslere offered to advance me the money necessary to purchase cattle and the outfit for crossing the plains, and I only escaped becoming a veritable "forty-niner" in California by a timely call to the key of the St. Louis telegraph office."

Captain Chas. E. Taylor, of Frankfort, Ky., then addressed the assembly, and having been appointed a committee to erect a monument over the grave of a fellow Old Timer, made his report. James F. Leonard, an Old Timer who had endeared himself to the fraternity by his good heart and phenomenal ability as an operator, was honored after his death by the erection of a fine monument over his grave at Frankfort, Ky. Captain Taylor's description of this and his able carrying out of the wishes of the society were recognized by the acceptance and filing of his report by the society.

The address and the papers were ordered to be incorporated in the minutes. The Hon. J. H. Wade, in a short speech, welcomed the association to the city. Mr. W. R. Plum in a speech enumerating his reasons for feeling attached to the city of Cleveland, concluded his remarks as follows: "We ought to be grateful that we were—that some of us are—Knights of the Key."

At an adjourned meeting held in the Board of Trade rooms the same evening, there was considerable discussion concerning amendments to the constitution, principally regarding the date of service which makes a man eligible to membership in the society. Mr. Rosewater, of the Omaha *Bee*, wanted 1863 made the limit, in order to preserve the society as an organization of pioneers. Several others favored his suggestion, but a motion to that effect was lost, as was a similar motion placing the limit at 1869, which would include those who had engaged in the telegraph business during the first 25 years of its existence. After a prolonged discussion, it was decided to leave that portion of the constitution unchanged.

A committee of three was appointed to revise the constitution and by-laws.

Mr. C. C. Hine, of New York, was unaminously elected President for the ensuing year. Capt. Chas. E. Taylor, Manager Western Telegraph Company at Frankfort, Ky., was unaminously elected Vice-President. Mr. W. J. Dealy was re-elected Secretary and Treasurer. Forty-five new members were elected.

A committee appointed to confer with a committee from the military society as to time and place of next reunion reported that they had selected Philadelphia as the place, and the third Wednesday and Thursday in August as the time, of the next meeting.

The military telegraphers held their meeting on Wednesday afternoon. The chief episode was the reading of the following address by Mr. W. R. Plum:

Comrades:—

Children have been born and become voters since the collapse of the Rebellion, and yet, though passing time drafts our members for its increasing quota, Congress again adjourns, leaving the U. S. Military Telegraph Corps unthanked and unrecognized.

No civilized government influenced by the voice of the governed has shown a more marked example of neglect, not to say ingratitude. If it be said that the reason for this neglect is that Congress has not sufficient time to consider our just claims, then it is manifest that the legislative business of this great country is poorly provided for. If this long silence arises from a fear of pensions to our deserving members whose cases cover all the reasons for giving such rights to others, the objection is unworthy of the broad culture and representative manhood we have a right to expect in the halls of our national Legislature; yet these two cover the only points ever advanced for this tedious delay.

For the sixth meeting, the fifth annual reunion, we are now assembled in part to arrange for another effort to secure a legal recognition of our *actual* army status; hence it becomes us to consult together over the past while we consider the present and future. A retrospect of the past reveals to the mind's eye many familiar faces of comrades who, if living, would rejoice in a personal presence with us, would rejoice in an opportunity to aid in your good work; faces that recall deeds of daring, courage unsurpassed, ability unexcelled; faces that would speak to us of Stone River, Vicksburg, Chickamauga, Antietam, Spottsylvania, the Wilderness, Cold Harbor, Petersburg, Atlanta, and scores of other campaigns or battles, besides raids and daring reminiscences; faces that bespeak hardship, wounds, disease; that manifest patriotism and devotion alone worthy of the recognition we seek—all, all only in memory's eye, in a receding vista, whither we too are tending.

Not these alone, but witnesses in our behalf, whom we were proud to serve, have, after the storm of war, entered that peace which passes understanding, but not without giving evidence of the value of our services. Such witnesses, Thomas, Grant, Hancock, Burnside, Hooker, McClellan, Warren and others, dead, fortified by Sherman, Sheridan, Logan, Franklin, Banks, and others of the living, make your case irresistible.

Since our last assembling, General Grant's promise to "show how indispensable the telegraph was to our success and how uniformly well the service was performed by the operators in the field," has had its fulfillment in the second volume of his memoirs. Writing of two things connected with all movements of the Army of the Potomac, he said of the army telegraph: "Nothing could be more complete than the organization of this body of brave and intelligent men. Insulated wires—insulated so that they could transmit messages in a storm, on the ground or under water—were wound upon reels, making about 200 pounds' weight of wire to each reel; two men and one mule were detailed to each reel. The pack-saddle on which this was carried was provided with a rack, like a saw-buck, placed cross-wise of the saddle and raised above it, so that the reel with its wire would revolve freely. There was a wagon supplied with a telegraph operator, battery and telegraph instruments for each division, each corps, each army, and one for my headquarters. There were wagons, also, loaded with light poles about the size and length of a wall-tent pole, supplied with an iron spike in one end, used to hold the wires up when laid, so that wagons and artillery would not run over them. The mules thus loaded were assigned to brigades, and always kept to the command they were assigned to. The operators were also assigned to particular headquarters and never changed except by special orders. The moment the troops were put in position to go into camp, all the men connected with this branch of service would proceed to put up their wires. A mule with a coil of wire would be led to the rear of the nearest flank of brigade he belonged to, and would be led in a line parallel thereto, while one man would hold an end of the wire and uncoil it as the mule was led off. When he had walked the length of the wire, the whole of it would be on the ground. This would be one in rear of every brigade at the same time. The ends of the wire would then be joined, making a continuous wire in the rear of the whole army. The men attached to brigades or divisions would all commence at once raising the wires with their telegraph poles. This was done by making a loop in the wire, putting it over the spike and raising the pole to a perpendicular position. At intervals the wire would be attached to trees or some other permanent object, so that one pole was sufficient at a place. In the absence of such a support, two poles would have to be used at intervals placed at an angle, so as to hold the wire firmly placed.

"While this was being done the telegraph wagons would take their positions near where the headquarters they belonged to were to be established and would connect with the wires. Thus in a few minutes longer than it took a mule to walk the length of its coil, telegraphic communications would be effected between all the headquarters of the army. No orders ever had to be given to establish the telegraph."

This, I may add, was substantially the case throughout our armies, only it must not be inferred that the lines were even usually constructed in the rear of the army, for such was not the case, and in very many instances our offices were worked in the very front lines of battle.

The merits of our claim have, fortunately for our encouragement, induced many powerful advocates in both branches of Congress, irrespective of party, to assure us of ultimate success. Three committees on military affairs, two of the House and the present Senate Committee, have reported in our behalf, all agreeing that we formed a part of the army of the United States in the war of the Rebellion, and should have honorable discharges.

The report of the House Committee of the Forty-eighth Congress recommending the passage of a bill quite satisfactory to us was in part as follows: "During the War of the Rebellion the military telegraph corps, consisting of about 1,200 operators and a sufficient force of line men, built and operated 15,389 miles of telegraph lines exclusively devoted to military purposes. In addition many commercial companies were temporarily from time to time made use of by the government. The service was creditably performed. The reports of the Secretary of War and the commanding generals give uniform testimony to their efficiency, intelligence and patriotism. Their duties were purely military and were performed with the same exposure to the dangers of the field and disease as fell to the lot of the ordinary officer and soldier. They constituted an integral and vitally essential part of the army, and brought the system to the state of perfection never before equaled in military science. Their duties required the service of persons of peculiar intelligence, and its members were picked from among the great number of operators on account of special prominence acquired in this mysterious art. Their duties were almost continuous, unrelieved by the excitements and relaxations of ordinary camp life. It is surprising that so important an arm of the service should have been organized on a civil basis, and its members only regarded as employés of the Quartermaster's department.

"The official record of its service is principally to be found in the pay-roll and an occasional notice in general reports. By efforts of personal friends, their history has been collected, and it is known that of the entire number 199 were either killed, died of disease, or were captured while in the line of duty. It is estimated that more than 100 others suffered from the casualities of the service.

"The present bill gives to those deserving persons a military status merely. It places them on the same footing as other members of the army, and accords to them at this late day the privilege of pension and homestead, to which they are justly entitled."

This report was adopted almost word for word by the House Committee of the Forty-ninth Congress, but unfortunately the bill itself was emasculated in committee until nothing was left of it except the declaration that we constituted a part of the army of the United States in the great war and a direction to the Secretary of War to issue to us certificates of honorable discharge.

Most of the members of your committee on Congressional action desired the passage of this bill as better than nothing, while others preferred non-action. For myself I was content to let it take its course without special effort to press it, and such appears to have been the result, for though the bill came up in its order and received a favorable vote of over four to one, the objection of lack of quorum relegated the subject to a back seat for the session.

The Senate Committee reported the preamble adopted by your Committee entire, and in the main the law portion except in matter of pensions, but by reason of a disagreement of the Senate Committee developed in the Senate itself concerning the assimilated rank clause, the bill at the request of Senator Logan was re-referred to his Committee. However, the debate showed that its main provisions were acceptable and that the Senator objecting to assimilated rank favored pensions.

Thus, my comrades, it appears that Congress is beginning to understand and appreciate the merits of our case. Success may be confidentially predicted. We have met no serious opposition anywhere, only the time of the long-desired consummation remains in doubt. Our advance has been steady from the start. Comrades Stafford, Maynard and Rosewater of your committee deserve special mention for their efforts in Washington in your behalf since our last meeting. Our cause, like many other good ones, has suffered delays that ought not to have occurred, but which, perhaps, are inseparably incident to most legislation.

It is now so well fortified, legislators have become so

conversant with it, that patient effort and a reasonable fund for incidental expenses, including occasional attendance at the Capitol of members of your committee, it is believed, will insure success.

It may not come in the next (short) session of Congress, but it is as certain as that our cause is just if we patiently persevere, and in taking my final leave of the presidency of this society, to which you have five successive times unanimously elected me, as I purpose shortly to do, I would most earnestly impress upon your minds the necessity for a patient insistence upon our just dues, as our greatest danger lies in needless discouragement, lethargy and inaction, in assuming that a few will do all that is required.

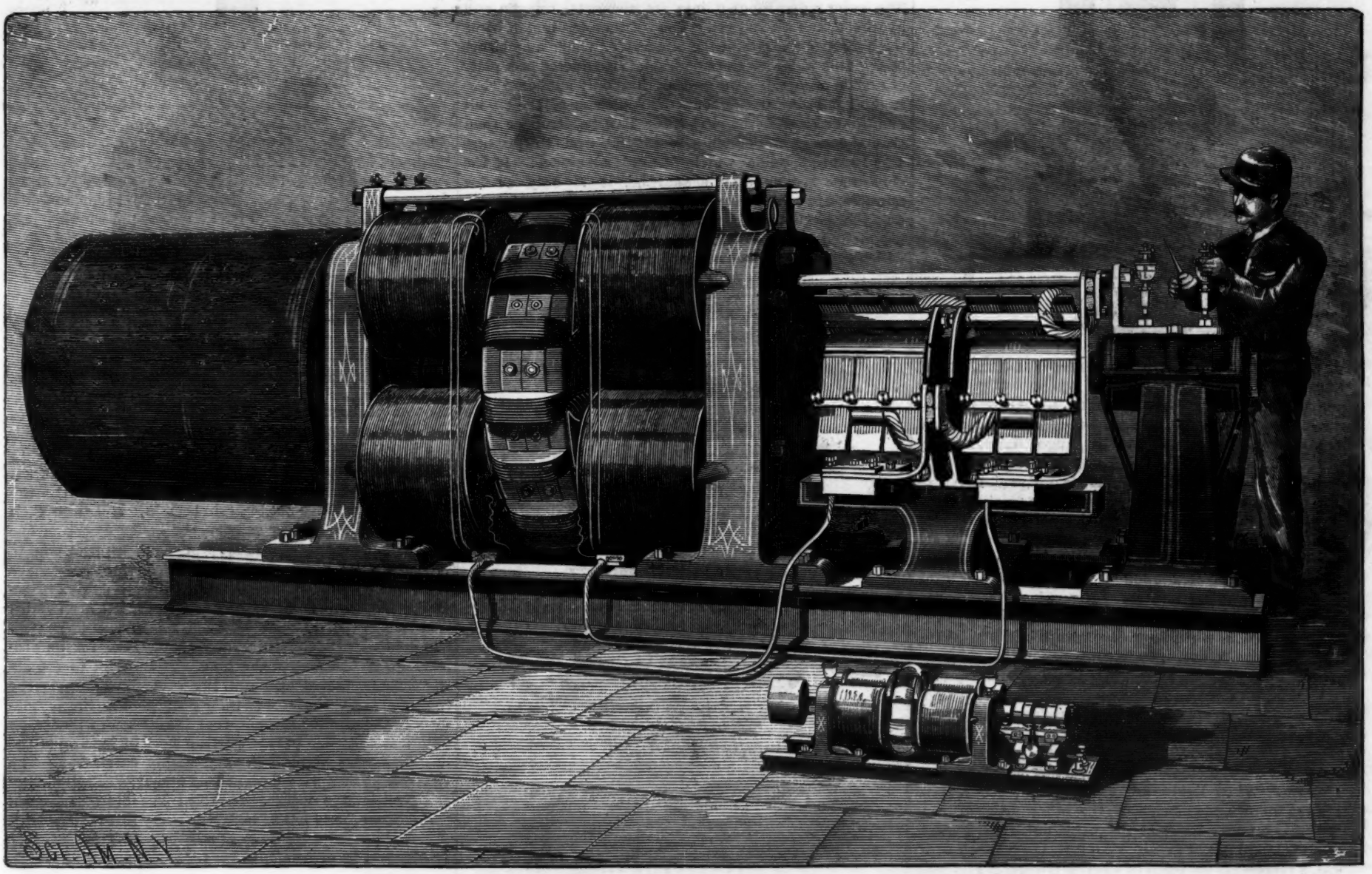
No honorary degree from our colleges, no wealth, no civic station, no peaceful victory, is more honorable than the diploma due us, an honorable discharge from the Army of the United States in the War of the Rebellion, coupled with a nation's thanks.

Mr. Plum was re-elected as president, Mr. George C. Maynard was elected vice-president, and Mr. J. G. Pettit re-elected secretary and treasurer.

A letter was read from Mr. J. H. Bunnell, of New York, presenting the military telegraphers with an elegant silver-tipped gavel. More than ordinary interest is centred about the gavel, from the fact that it is constructed of wood taken from the battlefields of Missionary Ridge and Chicamauga. Two bullets are imbedded in the wood, and the article is quite a curiosity.

land; Sol Palmer, St. Louis; J. W. Larish, Buffalo; O. O. Gurley, Cleveland; E. P. Wright, Cleveland; Isaac H. Kiertel, Indianapolis; E. C. Bush, Cincinnati; Henry H. Hall, Ashtabula; M. W. Barr, Washington, D. C.; Issac Morris, Cleveland; Harvey D. Reynolds, Buffalo; T. B. Fulton, New York; John Brant, New York; L. S. Jones, New York; Thomas Finnegan, New York; C. C. Hine, New York; Charles E. Taylor, Frankfort, Ky.; J. J. Calahan, New York; John Rathbone, New York; H. Y. Bresse, Binghamton, N. Y.; Thomas J. Cooper, Bay City, Mich.; A. P. Sanford, Painesville, O.; and C. F. Stumm, Cleveland, O. The following members of the Military Association were also at the table: W. R. Plum, Chicago; George Baxter, Erie, Pa.; J. W. Boyd, Pittsburgh, and C. W. Jacques, Ashtabula, O. The members of both associations present were: P. Bruner, Wellsville, O.; Louis A. Somers, Cleveland; M. Barth, Chicago; A. H. Bliss, Chicago; William J. Dealy, New York; E. Schermerhorn, New York; C. W. Hammond, St. Louis; A. W. Nohe, Chicago; William J. Ives, New York; M. H. Kerner, New York; George C. Maynard, Washington, D. C.; Joseph Knittle, New York. The guests at the banquet were: X. X. Crum, Cleveland, O. F. Stowe, Cleveland; J. C. Willive, New York; J. N. Bates, Cleveland; W. A. Dreher, Cleveland; Mrs. P. M. Barth and Miss Barth, Chicago; Mrs. A. H. Bliss and Miss Bliss, Chicago; Mrs. C. W. Jacques, Ashtabula, O.; and F. W. Hill, Cleveland. Beside each plate was placed a handsome menu card, the cover of which bore a tinted engraving of Professor Morse.

The banquet was followed by eloquent speeches and an "era of good feeling." The Cleveland meeting will be long remembered.



LARGE BRUSH DYNAMO FOR THE COWLES ELECTRIC FURNACES, LOCKPORT, N. Y.

Brush's Mammoth Dynamo.

The steady progress and increasing business of the Cowles Electric Smelting and Aluminum Company, some time ago caused the company to look about for greater facilities in the manufacture of its aluminum bronzes, and it finally settled upon Lockport, N. Y., as the most suitable place. It has erected large works there, so situated as to have available 2,000 horse-power of the immense water-power at that point, and it is now putting in place the first of the enormous Brush dynamos which will be used to generate current for the electrical furnaces. In our last issue we gave some figures showing the weight and dimensions of these mammoth machines, and this week we give an illustration of the dynamo, which we have reproduced from the *Scientific American*.

The machine weighs altogether nearly 22,000 lbs., of which the eight magnets comprise 9,295 and the armature 4,300 lbs. The machine is 14 ft. long, 5 ft. 2 in. high and 4 ft. 2 in. wide. The weight of copper wire used is 6,250 lbs., the diameter of pulley is 40 in., and its face 45 in The dynamo will be driven at a speed of 410 revolutions, giving a current of 3,000 ampères at 88 volts E. M. F. in the external circuit. The strength of current in the field is 80 ampères. The smallest Brush machine built stands in front, for comparison.

The enterprise of building so large a machine and its successful outcome must be considered as a decided step forward, and there can be no doubt that the future demands of electric lighting and electric power will necessitate the construction of dynamos able to supply several thousand lamps, or motors, such as this one is capable of maintaining. The refining and deposition business is also likely to take new and important departures.

Insulation of Underground Wires.

The following remarks on underground cables by Herr Siemens are given in the *Elektrotechnische Zeitschrift* for last month: "It will appear wonderful to many that jute is employed as an insulating material, and this is frequently ascribed to economical grounds only; but such is not the case. It is known that Sir W. Thomson has found that the plant fibres themselves are a perfect insulator. This induced us to employ this plant fibre for cables, while we made use of a special preparation to insure perfect freedom from damp. But the insulation would not be completely attained if the pores of the jute were not filled after the drying with some substance which is rendered liquid by heat, is a good insulator, and, besides, is not hygroscopic. It was already known to physicists that caoutchouc oil, obtained by the distillation of caoutchouc, possesses these properties in a high degree. It is a matter of essential importance to fill the pores of the dried insulating layer, and at the same time to make the lead case perfectly compact, which serves to cut off the damp of the ground. The lead pipe is now almost perfect. With underground telephone cables there are two evils to be combated, namely, electrostatic induction and electro-magnetic induction. The action of both phenomena is to give rise to disturbances in neighboring wires. The first kind of disturbance may be avoided by surrounding each wire by a conducting sheath. This, however, does not entirely ward off the electro-magnetic induction, which can only be obviated by the simultaneous action of currents of opposite direction. To get rid as far as possible of the electro-magnetic induction, we must use either double wires twisted so as to often change their position relative to one another, or a surrounding sheath of good conductivity in order that compensating currents of opposite direction may be generated. This is carried into effect by means of a closed copper sheath, which wards off the effect of static induction, and to a great extent that of the magnetic, too. But unfortunately this also occasions

On Thursday, about one hundred of the Old Timers and military telegraphers went to Cottage Grove Lake. The excursion was a complimentary one given by the Hon. J. H. Wade, who had arranged that two special cars should be attached to the regular train for the accommodation of the guests. A short run brought the merry party to the delightful resort, which soon received many encomiums from the visitors. The time at the lake was spent in boating and chatting, and the party returned to the city at 5 o'clock well pleased with the trip. A number of the visiting telegraphers were also invited to take a yacht ride with Mayor Gardner, and the "Marietta" was brought into service for the party. They enjoyed a three-hours' sail under a spanking breeze, and on their return to the city were escorted to Richards & McLean's restaurant.

The closing festivity of the reunion of the two societies was a banquet at the Stillman House. The elaborately finished dining-room was filled with long tables and forty Weston incandescent lamps threw their mellow light upon the scene. At the table were the following members of the Old Timers' Association: John B. Shaw, Jamestown, N. Y.; T. P. Scully, New York; A. L. Suesman, Chicago; Walter P. Phillips, New York; B. F. Lloyd, Cincinnati; Sam. J. Gifford, Dunkirk, N. Y.; John A. Townsend, Dunkirk, N. Y.; Fred. S. Smith, Cairo, Ill.; H. C. Vincent, Marietta, O.; W. W. Kelchner, Springfield, Ill.; J. Newton Crittenton, Chicago; W. J. Johnston, THE ELECTRICAL WORLD, New York; T. J. Higgins, Cleveland; William M. Woodruff, Cleveland; C. W. Douglass, Cleve-

a weakening of the currents, and consequently also of the sound in the telephone. This can, however, never be avoided, since it depends on unalterable natural laws.

New Electric Control Apparatus.

Where ordinary slide-valve engines are employed for driving electric light machinery, it has heretofore been a matter of considerable difficulty to obtain accurate regulation of the engine to conform to the number of lights in

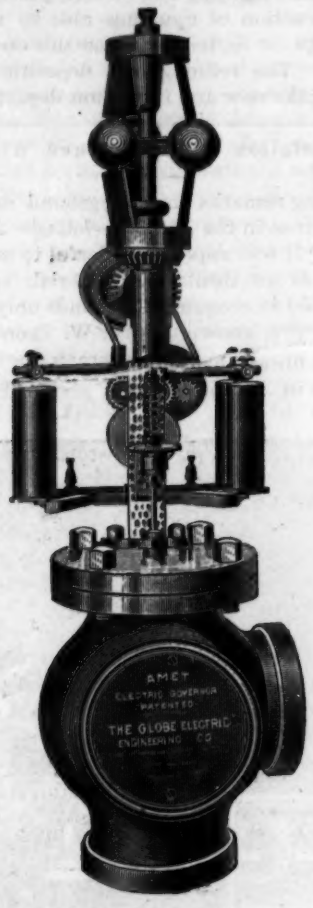


FIG. 1.—ELECTRIC GOVERNOR FOR SLIDE-VALVE ENGINES.

circuit. To overcome this difficulty, Mr. Amet has designed a governor whose operation is dependent upon the current itself, and hence accurately gauges the admission of steam to the cylinder according as it is required. Our illustration, Fig. 1, shows the governor designed for regulating the speed of the ordinary slide-valve engine to correspond with the number of lights burning. The current is passed through two electro-magnets, opposite which are mounted the armatures upon each end of a rocking lever, which is pivoted upon a train of three gear wheels. The central one of these wheels is driven from the governor belt. When the current becomes too strong, that is, when lamps are turned out, one of the armatures is drawn down, which puts one of the end gear-wheels in mesh with a pair of gears attached to the spindle of the throttle valve; and the movement imparted tends to close the valve and hence to reduce the speed until the normal current is reached. The armature is then released by the electro-magnet and the gear wheel is brought out of contact, stopping all further movement of the valve. When lights are switched on, the reverse operation follows, the motion of the other armature and gear wheel tending to open the valve until the normal current is again reached.

Fig. 2 represents the form of electric governor attached

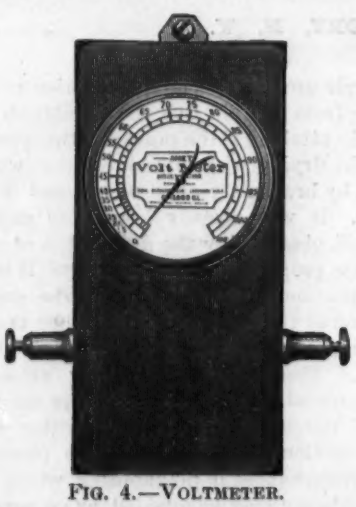


FIG. 4.—VOLTMETER.

to automatic engines to which it gives additional powers of regulation without interfering with the operation of the existing valve gear.

Acting upon the same principle, a water-wheel governor is also built by the Globe Iron and Electric Engineering Works of Chicago, which own all these devices. This has been attached to a number of water-wheels running dynamos and has given the greatest satisfaction.

In cases where it is desirable to run the dynamo at a constant speed and still keep the current constant under varying conditions, the shifting of the brushes will of course accomplish the desired object. Where such regulation is required, the brush shifter, shown in Fig. 3, can be applied with advantage. It automatically places the brushes in a position such that the lamps, whether arc or incandescent, are always maintained in their normal condition.

Besides these governors, the Works manufacture a variety of other electrical apparatus, among them, arc lamps of the rack and pinion type, ammeters, lightning arresters, etc. The voltmeter, which is shown in Fig. 4, is of very simple construction and is calibrated from zero up to 108 volts in 2½ volt divisions. The novel lightning arrester shown in Fig. 5 consists of two spiral springs made of heavy wire and placed one within the other. The outer spring has its terminals connected to the earth and the inner spring forms part of the line to be protected. This form of arrester is said to be a positive protection, carrying off the largest charges with ease.

A New Method of Protecting Iron.

M. A. de Meritens, the well-known French electrician, has brought out a new method of protecting iron. The article to be protected is placed in a bath of ordinary or distilled water, at a temperature of from 70° to 80° C. (158° to 176° F.), and an electric current is sent through. The water is decomposed into its elements, oxygen and hydrogen, and the oxygen is deposited on the metal, while the hydrogen appears at the other pole, which may either be the tank in which the operation is conducted or a plate of carbon or metal. The current has only sufficient electromotive force to overcome the resistance of the circuit and to decompose the water, for if it be stronger than this, the oxygen combines with the iron to produce a pulverulent oxide which has no adherence. If the conditions are as they should be, it is only a few minutes after the oxygen appears at the metal before the darkening of the surface shows that the gas has united with the iron to form the magnetic oxide, which it is well known will resist the action of the air and

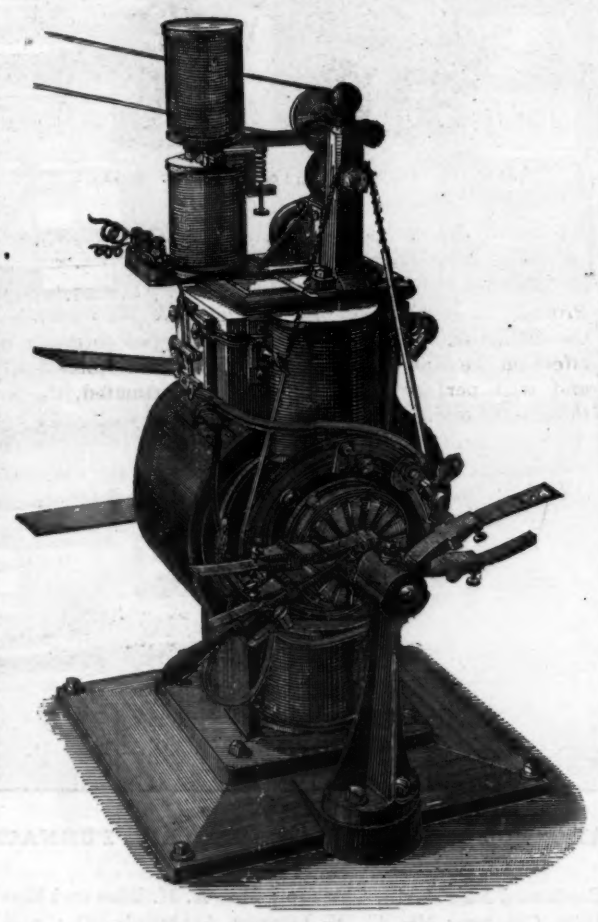


FIG. 3.—AUTOMATIC BRUSH SHIFTER.

protect the metal beneath it. After the action has continued an hour or two the coating is sufficiently solid to resist the scratch brush, and it will then take a brilliant polish. The depth of penetration is shown by the following fact. A gun barrel was oxidized, and then the magnetic coating was completely removed by emery, until the surface again became white. It was again returned to the bath, and immediately on the passage of the current the black color again reappeared. If a piece of thickly rusted iron be placed in the bath, its sesquioxide is rapidly transformed into the magnetic oxide. This outer layer has no adhesion, but beneath it there will be found a coating which is actually a part of the metal itself.

In the early experiments with this process, M. de Meritens employed pieces of steel only. But when he turned to objects in wrought and cast iron, he found that he no longer was successful, for the coating was not fast and came off with the slightest friction. After many trials with currents of different electro-motive force, he reversed the order of affairs, and placed the iron at the negative pole of the apparatus after it had been already applied to the positive pole. Here the oxide was reduced, and hydrogen was accumulated in the pores of the metal. The specimens were then returned to the anode, when it was found that the oxide appeared quite readily and was very solid. But the result was not quite perfect, and it was not until the bath was filled with distilled water in place of that from the public supply that a perfectly satisfactory result was attained. The process, it will be seen, is perfectly simple, and demands but little skill in its execution. Now that dynamo machines have superseded batteries as sources of electricity, all that is required is a tank, a quantity of distilled water and a little power to drive the machine. By placing a number of baths in series, and increasing or diminishing their number, the electromotive force of the current can be regulated without any arrangements of artificial resistance.

A Novel Way of Lighting a Powder Mill.

A somewhat novel arrangement has recently been

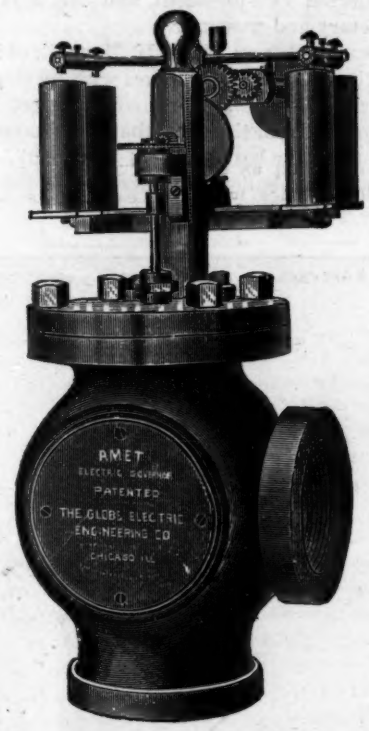


FIG. 2.—ELECTRIC GOVERNOR FOR AUTOMATIC ENGINES.

adopted for lighting the outlying sheds and warehouses of the Royal Gunpowder Factories at Waltham, England. The principal part of these works has been lit by electricity for some considerable time, but many of the storehouses, which are situated at a considerable distance from the dynamo room, have not hitherto been lit. But since each of these buildings stands upon the banks of one of the numerous canals by which the works are intersected, the superintendent, Colonel W. H. Noble, R.A., has devised a very simple and effective plan for lighting them when required. A small boat, 25 feet in length, has been built, capable of carrying about 30 of the E.P.S. cells (type 238), and is fitted with an electric motor and screw for its propulsion. When any of the buildings referred to are required to be visited at night, the boat moves up to the spot, and the batteries are then connected to the permanent installation of incandescent lamps with which each building is fitted. In this way the work of loading or unloading barges at night is very readily carried on. The electrical details were designed by Mr. T. Webb, the chief engineer of the works. The boat has been christened "The Spark," and has so far given every satisfaction.

Improvements in Accumulators.

M. Emile Reynier has succeeded by very simple means in overcoming the difficulty which sometimes arises from the swelling of the plates of accumulators during the process of charge. The plates constructed by M. Reynier are bent to and fro so as to present a succession of shelves or corrugations, and the active material is strongly compressed into the spaces thus provided. This particular feature is not new in itself, but the present improvement consists in bending the plates into the form of an arc of a cylinder whose axis is perpendicular to the direction of the

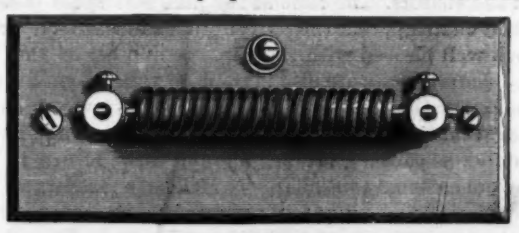


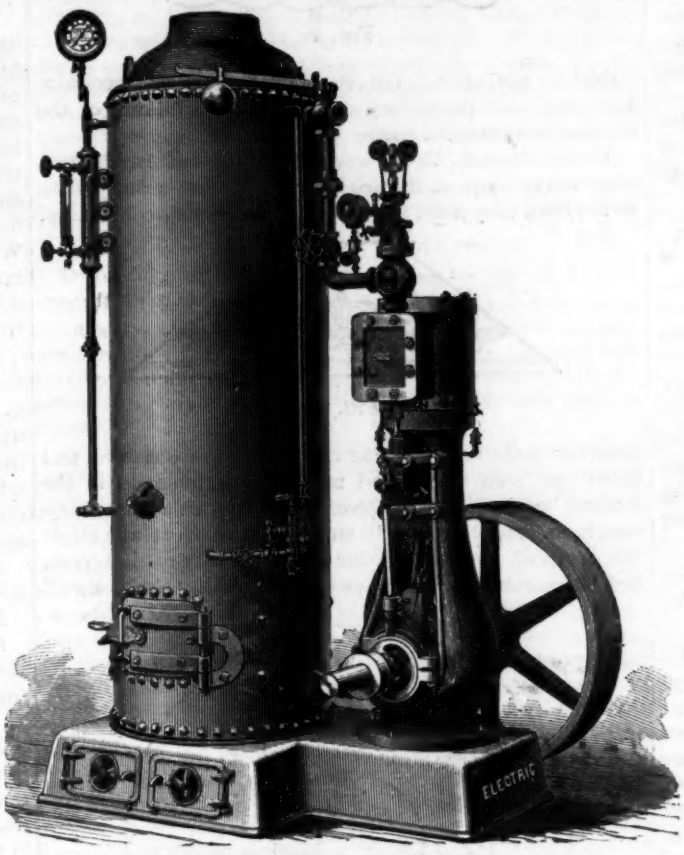
FIG. 5.—LIGHTNING ARRESTER.

corrugation. A battery of this construction has undergone a trial of some duration at Marly (Switzerland), and is said to have been perfectly successful.

The New Edison Works.—In addition to the two immense buildings which the Edison Company have just purchased at Schenectady, N. Y., there will be two more built, so that the works may easily accommodate 1,200 machinists. Of the buildings now standing, No. 1 will be devoted exclusively to the manufacture of electrical apparatus, and in No. 2 shafting will be made and general machine work done.

The Combined "Electric" Engine and Boiler.

While the establishment of central stations for incandescent light is steadily progressing, their number has not yet by any means reached that of the arc light, and hence isolated incandescent plants are frequently met with. For such, a good engine and boiler, occupying small space, is desirable, and as a solution of the conditions involved, Mr. H. M. Sciple, of Philadelphia, has designed the combination of engine and boiler shown in the accompanying illustration. The boilers are made of the best steel throughout, and all sizes up to eight feet in height are made of one piece in the shell. Several improvements of value have been introduced in the engine which conduce to economy. Among these are the automatic packing rings, which prevent the escape and loss of steam past the piston. In order also to avoid cylinder condensation and radiation, the cylinder is jacketed and the hot air from the furnace of the boiler is made to pass around the cylinder. As the engine is not fastened to the boiler in any way, it is not affected by expansion or contraction of the latter. The whole combination has been designed with a view to the greatest economy and durability, and as the parts are all made interchangeable, repairs when necessary are easily effected.



THE SCIPLE ENGINE AND BOILER.

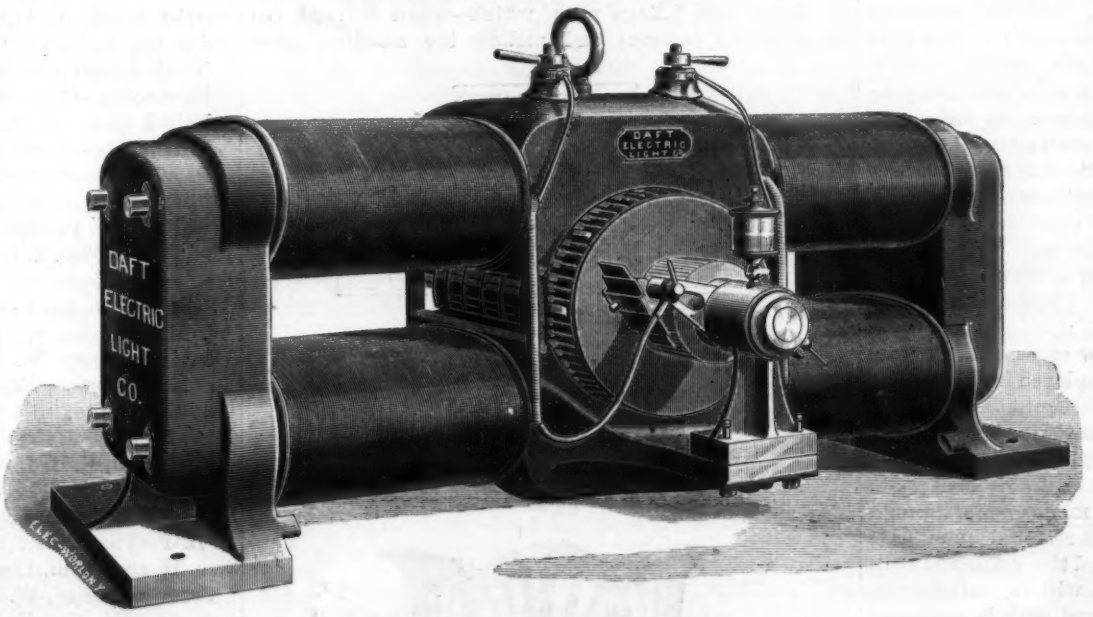
An Abstract on Secondary Electrolysis.

E. Semmola, in the *Journal* of the Chemical Scci ety, says: If a small ribbon of platinum is immersed in a voltameter containing acidulated water in such a way that its ends are opposite the electrodes of the voltameter, and a powerful current is passed through the latter, hydrogen and oxygen are evolved not only from the electrodes, but also from the ribbon. This secondary electrolysis varies greatly with different conditions, and ceases altogether when the current is not strong; but if oxidizable metals are used instead of platinum, it becomes much more energetic. The phenomena are well seen with amalgamated zinc, which is not attacked by acidulated water except when the current passes. When the circuit containing the voltameter is closed, hydrogen is given off from one-half only (the negative half) of the zinc, while oxygen is absorbed by the other half. If several pieces of zinc are immersed in the water in the voltameter, hydrogen is given off from each of them. This secondary electrolysis is due to a current derived from the immersed zinc.

A New Daft Generator.

The accompanying cut shows the latest development of the Daft dynamo and represents the No. 5 machine, weighing about 2½ tons. The armature has but two turns of copper per section and a resistance of .025 ohm. The difference of potential at terminals is 125 volts, and is maintained with remarkable constancy over a wide range of external resistances.

A large number of these machines are now in process of manufacture to fill orders for this country and England. In using them for incandescent lighting with a somewhat lower potential, it is not found necessary to employ any external regulating appliances, the machines easily regulating when the load varies, from one lamp to the maximum number.



A NEW DAFT GENERATOR.

High-Tension Distribution.

Possibly the title of this notice may give rise to some misapprehension on the part of our readers, since the system of distribution to which we refer should perhaps more properly be called low-tension distribution from high-tension currents.

We have already referred on several occasions to the incandescent system of the Sun Electric Company, of Woburn, Mass., and their protective apparatus for incandescent lamps on arc light circuits; and some further notice of their system may be of interest to our readers in view of the coming Electric Light Convention, at which, we are given to understand, some of their protectors or distributors will be in operation. A striking feature of the system is its simplicity and the small number of parts required to produce the effects desired. All that meets the eye in the ordinary double box for, say, 9 to 18 or 12 to 24 ordinary 16 c. p. lamps is a pair of solenoids with movable cores, and the necessary contacts and connections. In addition to these, there is a simple but effective switch operating automatically to reduce the energy consumed when the number of lamps falls below a certain predetermined limit. For a small number of lamps, say 3 or 4, resistances are interposed to preserve the balance of the circuit.

The distributors are made of various sizes and capacities, so as to meet varying requirements. If, for example, a particular consumer should desire a smaller number of lamps of the same or a different candle-power, he could have them, and, as in the other boxes or circuits, he could remove from the circuit any or all of his lamps without injury to the others.

It has been suggested that a system of incandescent distribution from high-tension circuits is dangerous. This company appears to have shown, in practice, that it is nothing of the kind, thus confirming the opinions advanced by Professor George Forbes in his lectures last year in England.

It is perfectly well understood, of course, that incandescent lamps can be operated from arc light, or, properly speaking, high-tension circuits. By the arrangement provided for in this distributor, the ingenious invention of Prof. M. M. M. Slattery, the electrician of the company, the extinction of one or more lamps is imperceptible in its effect on the others, this being provided for automatically and with perfect safety. As before intimated, the arrangement of circuits is not merely adapted with reference to 9 or 18 lamps, nor is the remaining work all lost when a certain number of the lamps are cut out. For example, a man may have in his store four 16 c. p. lamps, and he desires, at night, to leave two alight; he can do so, using only the energy of two, paying for that energy, and not paying for nine or ten lamps when he is only using two. The circuits can be widely varied with reference to the probable requirements of each customer, and lamps of different candle-powers can be protected by the same distributor box.

We understand that there will be also on exhibition at the convention some of the large incandescent lamps of this company, which they have christened the "Regina," three of which take the current of an arc lamp and are run at about 90 volts. They are provided with a neat shade or reflector, and a simple cut-out and resistance to provide against the contingency of the breakage of a lamp.

These lamps have an illuminating capacity of about 120 c. p., and are made for Brush, Thomson-Houston, or similar machines, on which they are now being largely used. "Princess" lamps of a similar character, but of about one-half the candle-power, are also made by this company.

As our readers will see, they are striking out in the right direction for long-distance illumination. It is, of course, perfectly well known that for long distances the ordinary low-tension system presents difficulties on account of the large size of conductor required; while, on the other hand, although the arc light can be operated at long distances from the source of generation of the current, for many purposes it is unsatisfactory or entirely unsuitable. Large lamps operating on the incandescent system give a light brilliant enough for all practical purposes, except possibly for the illumination of wide streets, parks, squares or other large, open spaces.

The cost also of large incandescent lamps, if possessing a reasonably long life, very slightly, if at all, exceeds that of the arc.

The company express their readiness to meet prospective customers, and to give them every information in their power, while, by making their prices as reasonable as is consistent with good work, they are content to make "Ex luce lucellum"—"Out of light, a light profit."

The Gray Caveat.

Little that is new has been made public this week in regard to the Gray caveat, and the reports that it has been reinstated still lack absolute confirmation. The following statement comes from Washington in regard to the latest developments of telephonic patent matters there. It is in substance this: That there has been pending before the Patent Office since 1878, and is now pending there, an interference case between Edison and E. Berliner of Washington for an application for a patent for the broad claim of the carbon transmitter. No patent for the broad claim has as yet been granted by our Patent Office, but Edison has secured patents in England for a carbon transmitter, which have been sustained by the British courts. Both of these applications, a lawyer insists, are owned or controlled by the Bell Company, which wil be the beneficiary of whatever patent, if any, may be granted. This application, he says, has been kept alive in due legal form by continuances and delays of various sorts until the present time, and there is still no apparent endeavor to secure a decision. The case is not even before a board or an examiner, but has been certified up as an interference. Neither party seems to be ready, and both parties have influence enough to secure delay. If a patent, however, shall at any time be granted to either of the applicants, and this patent so granted shall come into the possession of the Bell Company, a new monopoly in telephone patents will date from the day of the issue of such a patent, to continue for an additional seventeen years. There is, of course, no way of verifying this statement, unless one of the parties in interest shall choose to affirm or deny it. So far as the Patent Office is concerned no one except the alleged parties in interest is entitled to any information upon the subject. If this application has been kept in interference since 1878, as is alleged, this has been done for a purpose, and if such a patent is to be granted, and is to be the property of the Bell Company, it will readily been seen that every year of delay in the issuing of it will give the patent an additional value. It is possible, however, to hear almost any report about a telephone patent since the recent statement that the Gray case has been reinstated, of which there is no reasonable doubt. The latest story circulating among Patent Office officials is this: That Casey Young claims to have made a discovery by accident which is of great value to Prof. Gray, or to his syndicate; that this discovery consists in finding somewhere, in a remote place in the Patent Office, a box (accidentally pigeonholed or intentionally mislaid) which contains evidence which is to be relied upon in establishing the claim of Prof. Gray. More than this vague statement those who claim to be informed as to this new Pan-Telephonic mystery decline to say. There is a popular misapprehension, however, as to what has actually been done about the application of Prof. Gray for a patent. The report that it was expected that the patent list of last Tuesday would contain the announcement that a patent had been granted to him was, of course, absurd. Prof. Gray and the Bell Telephone Company, or rather the Gold and Stock Company, assignor to the Bell Company of the rights and patents of Gray, supposed at one time that all of the rights and patents and claims of Gray to a telephone patent had been disposed of for a consideration, which was received by Gray; that is still the theory of the Bell Company.

Telegraphers' Mutual Benefit Association.

We print below the proposed amendments of the Constitution and By-laws of the above association, placed in the hands of the Secretary, Mr. C. P. Bruch, for submission at the annual meeting. They involve some extremely important points, and should be carefully studied by every member:

Amend Section XX. of the by-laws to read as follows:

"The initiation fee for membership in the second division shall be two dollars ($2.00)."

"A separate account shall be kept of the funds of this division, and it shall bear its own expenses and its proportion of expenses incurred for the benefit of the association, which are not distinctly chargeable to either division alone; such proportion to be based upon the relative membership of the divisions and the number of assessments levied by each."

(In case the amendment providing compensation for agents is adopted, it is understood that the amount of initiation and restitution fees for the second division shall be three dollars ($3.00) and four dollars ($4.00).

CHAS. P. BRUCH AND 27 OTHERS.

Proposed amendments to Sections VIII. and XXVI. of the By-laws.

NEW YORK, Aug. 4, 1886.

I propose that the Constitution and By-laws be amended as follows

Strike out Section VIII. of the By-laws and substitute therefor the following:

"Section VIII. Upon the death of a member in good standing, the Secretary, when directed so to do by the Executive Committee, shall levy upon each surviving member assessments in accordance with the following table, viz.:

"Upon members admitted prior to, and in good standing on, Jan. 1, 1887, (on which date this amendment takes effect), $1; upon members admitted on and after Jan. 1, 1887, whose age at entry shall be between 18 and 30, $1; between 30 and 35, $1.25; between 35 and 40, $1.50; between 40 and 45, $2.

"Any member who does not pay an assessment within thirty (30) days of its date shall forfeit all claim to the benefits of the association, and should the assessment remain unpaid sixty (60) days after its date, he shall forfeit membership, to which he can be restored only as provided in the Constitution and By-laws.

"Restored members shall be assessed in accordance with their age at restoration."

Strike out Section XXVI. of the By-laws and substitute therefor a section identical with the foregoing, excepting that it shall read: "Upon the death of a member of the Second Division in good standing, etc."

CHAS. P. BRUCH AND 27 OTHERS.

Proposed amendments to Sections IV. and VII. of the By-laws, Section I., Article 2, of the Constitution.

NEW YORK, Aug. 4, 1886.

I propose to so amend Section IV. of the By-laws that it shall read as follows:

"The officers of the Association, except the Secretary, shall serve without compensation; but the Secretary shall, by and with the advice and consent of the Executive Committee, appoint a properly qualified person to act as clerk for the Association, who shall receive such compensation for his services as may be authorized by the annual meeting; or in lieu of appointing such clerk, the Secretary, with the approval of the Executive Committee, may act as clerk and receive the said compensation.

"A commission of one dollar ($1) upon every accepted application in either division may be paid to the agent through whom such application shall be forwarded."

Amend Section I., Article 2, of the Constitution so that it shall read:

"Any person of not less than 18 or more than 45 years of age, in good health and who is employed in telegraphic service, and is otherwise qualified as required by the By-laws, shall, upon payment of an initiation fee of three dollars ($3), be eligible to membership."

So amend Section VII. of the By-laws that it shall read:

"Any person who has forfeited membership through non-payment of assessments may be restored upon payment of a fee of four dollars, provided the applicant shall furnish the Executive Committee with a satisfactory medical certificate of examination and shall be possessed of all the qualifications of new members."

CHAS. P. BRUCH AND 27 OTHERS.

Electric Light Globes and Shades.

Decorative art in the household and the places where men are wont to assemble has advanced immensely of late years. Notable artists consider decorative design to be worthy of the best efforts of their brush or crayon; authorities, dogmatic and critical, lecture the public on the best means of learning the principles of true art; and handbooks by the score give directions on the most approved methods of adorning the House Beautiful. In this æsthetic movement the electric light has been appropriately acknowledged by many as a great help, being not only highly ornamental in itself, but a favorite resort in the production of brilliant effects in the house, the theatre, the hall or the church. It was discovered long ago that gas injured pictures and other works of art; no reader who values his books cares to burn much gas near them, as it rots their covers off; while curtains and carpets soon lose their color through the same agency, and mural decorations become sadly dimmed and tarnished. It does not seem as though electric lighting companies had made enough of the argument based on what we may call

FIG. 2.

"electric æsthetics," but the tendency is to recognize more and more the beauty as well as the brilliancy of the arc and incandescent lamp.

At first, electric lights were anything but handsome, even to-day some of the arc lamps are more grimly utilitarian than they need be. With the incandescent lamp,

FIG. 1.

however, some very pleasing effects are now obtained, and there has been steady and marked improvement in the fixtures bearing them. The ease with which an incandescent lamp can be burned in any position and at any angle has tempted the imagination and ingenuity of designers, and hence results are achieved to-day with "electroliers"

FIG. 4.

that were never dreamed of with the rigid, heavy and somewhat vulgar gasolier. Various exquisite effects have also been reached in electric light globes and shades, and the vegetable kingdom has been ransacked for groupings of flower and foliage with which—when worked out on glass—to enhance and mellow the steadfast glow

FIG. 3.

of the incandescent lamp. We illustrate on this page, for example, a few of the praiseworthy products in this line by the New England Glass Works of W. L. Libbey & Son, Boston. Fig. 1 is an etched piece, with 8-inch cone; Fig. 2 is decorated; Fig. 3 illustrates an 8-inch dome; Fig. 4 is an 8-inch cone shade,

FIG. 5.

and Fig. 5 is a representative of the "fancy" shapes in colored glass. The firm has several hundred designs, copied after nature, conventionalized, or embodying some quaint idea. The increased use of such accessories would, we think, go far to recommend the electric light, and lead to its wider use not only as a decorative agent, but as being more cheerful and ornamental than any guttering candle, ill-smelling oil lamp, or flickering gas jet that has preceded it. The incandescent lamp spares the eye in order to gladden it with new triumphs of art and refinement.

The Clambake of the Year.

The eighth annual clambake given to its friends by the American Electrical Works, Providence, R. I., took place on Friday, 20th inst., at Rhodes-on-the-Pawtuxet. The committee of arrangements were Messrs. A. C. White, J. I. Sabin, H. W. Pope, E. B. Baker, G. L. Beetle and W. H. Sawyer, while Mr. Eugene F. Phillips, the president, gave to the whole festivity his watchful and benign supervision. During the morning the guests, numbering about 125, drove down in parties to the pleasure grounds in large "barges" from the doors of the Providence Telephone Exchange, and a lunch was served at 11:30.

The sports customary on these occasions were freely indulged in under a genial sky and with the utmost hilarity. Football helped to lessen the adipose tissue of some, while archery and rifle shooting used up the small change of others. The man who won the rifle "pot" said he felt as though he owned a block of Providence telephone stock. Mr. R. W. Pope ran the archery "pool," and Mr. H. W. Pope looked after that for the rifle shooting; both with the aplomb of bookmakers and the nerve of Wall street brokers. One interesting episode was that of taking a group photograph, when, at the request of the artist with the camera, all tried to look sorry for their friends who had not come.

The most exciting event was a base-ball match, in which four innings were played, with a score of 14 to 6. Mr. H. C. Bradford covered himself with glory as being the only umpire who has given satisfaction on base-ball grounds this year. The lightning scorer was Mr. E. B. Baker, while Mr. J. W. Duxbury held the coats and revised the returns. The winning team is heavily backed for League and Association matches next season.

After a pleasant morning, the following gentlemen sat down to the bake, which was served at 3 P. M.:

Binghamton, N. Y.—John Anderson.

Boston—N. W. Lillie, E. Backus, A. L. Russell, F. A. Hanaford, John J. Carty, Frank Ridlon, E. S. Beckford, Wm. S. Scales, P. Fahey, Chas. Burgher, H. J. Miller, J. H. Clarke, Edward S. Sears, Allan V. Garratt, Frederick Schaefer, W. S. Hill, W. E. Clapp, Mark Simons, Geo. W. Adams, C. J. Sheehan, F. J. Boynton, C. W. Rand, T. B. Bailey, H. J. Pettengill, Wm. F. Chester, Charles L. Bly, S. E. Barton, W. J. Keenan, A. D. Wheeler, A. D. Blodgett.

Bridgeport, Conn.—T. B. Doolittle.

Brooklyn—C. H. Carter, Henry A. Sinclair.

Danbury, Conn.—G. W. Hoyt, F. A. Hull.

Fall River, Mass.—Chas. Sylvester.

Greenfield, Mass.—John F. Hoyt.

Hartford, Conn.—N. H. Stevens.

Lexington—C. H. Stoll.

Louisville—A. L. Schmidt.

Newark—C. O. Baker, Jr.

New Bedford—W. K. Wagner, W. R. Sherman.

New Haven—E. B. Baker, W. S. Crofut.

Newport—J. Carroll, Henry W. Cozzens.

New York—George M. Robertson, Henry W. Pope, D. E. Drake, C. E. Stump, H. S. Thornberry, G. A. Hamilton, Gerritt Smith, A. A. Knudson, Ralph W. Pope, Chas. W. Price, Geo. L. Beetle, Chas. T. Hughes.

North Adams—W. H. Stedeman.

Pawtucket—C. H. Bullock.

Philadelphia—H. A. Cleverly.

Pittsburgh—George F. Porter.

Providence—F. C. Buswell, Van A. Thomas, E. M. Carhart, E. A. Smith, J. W. Duxbury, J. O. Darling, Aug. Wright, E. F. Phillips, H. C. Bradford, John I. Drake, W. H. Sawyer, Chas. E. Lincoln, C. R. Weeden, Chas. T. Howard, W. W. Dempster, L. L. Burdon, R. H. Whittier, John T. Jaques, Richard D. Knight, Henry H. Harris, Geo. W. Millard, H. W. Kilbourne, S. R. Payson, C. H. Douglas, Henry W. Breckenridge, H. Howard, Chas. G. A. Peterson, P. J. Hurlburt, Abiel F. Davis, A. C. White, H. C. Langstaff, C. H. Fuller, E. C. Perkins, Edwin Lowe, A. S. Miller, G. C. Sims, H. C. Cranston, E. H. Howard, J. H. Chace, Geo. J. Adams, E. W. Fyler, D. F. Hayden, J. M. Addeman, W. A. Hathaway, C. R. Remington, Jr., L. W. Clarke, W. N. Munro, F. H. Peckham, Jr., C. M. Carpenter, John E. Belcher, Geo. H. Burnham, Henry H. Sherman.

Santo Domingo, W. I.—Preston C. Nason.

Somerville—Geo. E. Hanson.

South Framingham—J. T. Hyland.

Springfield—F. G. Daboll.

Taunton—D. L. Mitchell.

Washington—Fred. W. Royce.

Waterbury—A. O. Shepardson, A. M. Young.

Woburn—Marmaduke M. M. Slattery.

Worcester—Wm. Brophy.

Ex-Gov. Howard, in the address of welcome, made a few remarks in happy vein; while Mr. Phillips was witty by being both brief and humorous in what he had to say with wonted modesty; and then the company fell to with a gusto that indicated a very high appreciation of good things, and of clambakes in particular. The memento of the occasion was a tasteful and ingenious menu. On the front cover of a four-page folder was Freddy's little slate, with an embryonic sketch representing "the clam that sees the man and the man that seizes the clam." The inner pages bore the appe-

tizing list of dishes, and on the last page was a clean slate, upon which, as they were also provided with pencil and sponge attached by cord, the guests could note their varying emotions and sensations. So general was the good feeling, and the enjoyment, that all present on the list above wished to come again, without any breaking of the slate. In fact, the reason why some jovial Western telephone men are seeking to form a seaside colony at Watch Hill, near by, is said to be their desire not to miss a single "clam-bake of the year."

Lightning Photography.

To the Editor of The Electrical World:

SIR: In your issue of last week, giving an account of the supposed effect of lightning in imprinting an image on a plaque, wherein you do me the honor to quote my opinion as reported in the newspapers, I am represented as confounding two such widely different substances as potassic bichromate and the resinous coloring matter known as dragon's blood. I am also quoted as attributing the change to "oxidization under the intense electric light."

As both of these statements are admirably calculated to cause you some little trouble by attracting the ever-ready and voluminous critic, I trust you will permit me to quote the concluding portion of the only opinion I have ventured to express in advance of experiments now pending:

"It is well known that certain lacquers, especially those containing coloring matter, are more or less sensitive to light, and in the absence of a proper analysis of this particular lacquer, I am led to suspect that the substance known as 'dragon's blood' was used, which in combination with certain gums commonly employed by lacquer manufacturers, exhibits marked effects by long-continued action of even a feeble diffused light. It is not, therefore, impossible that such an intensely actinic image as would be projected from a brilliant and near flash of lightning reflected from the face to the inside of the opposite bay window-pane, and from thence to the tray, effected a change in the fraction of a second which would represent that due to many days or even weeks of subdued diffused light, and thus produced the image by reducing that particular spot to the condition which time will develop over the whole surface." LEO DAFT.

PLAINFIELD, N. J.

NEW YORK NOTES.

OFFICE OF THE ELECTRICAL WORLD,
NEW YORK, Aug. 23, 1886.

The American Electric Manufacturing Company, No. 146 Broadway, reports business active and prospects good. Last week it secured the contract for lighting the city of Augusta, Ga., with 150 arc lamps. The electric light appears to be growing in popularity throughout the South, and it is very certain that the American lights will do much to enhance the beauty of the long and leafy avenues of fair Augusta.

The Dexter Engine Company, No. 40 Cortlandt street, is manufacturing an excellent high-speed engine with automatic regulation. The company is very conservative in its statements, making no special claims for the superiority of its engine in the electric lighting field. It simply guarantees each engine to be what it is sold as; and a full line is carried of upright and horizontal slide valve engines, which it believes will do good work at a very low cost for the plant. The company has, too, a combined upright engine and boiler on one base, which it offers for electric lighting.

The Van Choate Electric Light Company is installed at 45 William street. I notice that some of the Electric Sugar Refining Company's people are managing the concern.

Hine & Robertson, 12 Cortlandt street, are busy putting up their Kellam Damper Regulator. They consider that electric light plants are not complete without this apparatus to regulate the draft for the boiler.

The Electric Time Company (Carey system), 146 Broadway, informs me that it is placing all the clocks it can produce with its present facilities. Telegraph and telephone managers, as well as others interested in electrical developments, should investigate this system, to introduce it in connection with its present business.

The "Perfect Protection" lightning arrester, controlled by the Electrical Supply Company, New York and Chicago, is guaranteed to give thorough protection to the dynamo under all circumstances. The Haskins hanger, for suspending arc lamps over sidewalks or on poles, is certainly one of the most simple and effective articles of the kind, and the company recommends it to the attention of all electric light companies. The company is having an unusually large sale of test instruments, galvanometers, rheostats, Wallace Diamond carbons and its other specialities.

I hear there is a new electrical machine in the market that will transmit writing in fac-simile telegraphically to any distance. Details are in order.

Medical batteries, my friends in the trade tell me, were never more in demand than now, especially first-class faradic current batteries that can be handled to meet the most delicate susceptibilities of the patient. I hear that dealers and supply houses in all parts were never more busy disposing of these goods. Messrs. Fink Brothers, three active young men, with office in Elizabeth street, this city, and factory at Roselle, N. J., have secured excellent facilities for manufacturing their Acme and Crescent electro-medical batteries, both of which are enjoying brisk sales. Working up to their full limit of production, the firm find it hard to fill orders "on sight," and hence like their customers to order early and keep a supply on hand. When this is the practice, they offer large discounts. W. T. H.

NEW ENGLAND NOTES.

HOLYOKE, Mass., Aug. 19, 1886.

The Holyoke Electric Light & Power Company has enlarged its station and increased the lighting capacity. A Hercules water-wheel of 250 horse-power and a double Buckeye engine of 375 horse-power have been added to the equipment of the station. At the present time 75 street (arc) lights and 96 commercial (arc) lights are being furnished, together with several hundred incandescent lights, off arc-light circuits, by aid of distributing boxes of the Schuyler system; but orders are already in hand for nearly one hundred additional arc lights, and a large number of incandescents. Seven 30-light dynamos of the Schuyler Company's make are now in position, and each machine has a separate circuit. The dynamo room is sufficiently large to admit of fifteen additional 30-light machines being set up without making the station look at all crowded. The new shafting, pulleys, etc., in addition to the Hercules water-wheel referred to, put in by the Holyoke Machine Company during the past month, add to the beauty as well as the power of the station. Superintendent Winchester says: "This station has been on a paying basis for several months, and the city authorities, and those using electric lights in their stores or residences, are perfectly satisfied with the lights furnished and the prices charged." W. I. B.

WATERBURY, Conn., Aug. 19, 1886.

The Waterbury Watch Company has broken ground for the early erection of another magnificent addition to its factory on the land adjoining the building at present occupied. It is expected that the new building will be finished and fully equipped with the latest improved watch-making machinery by the first week in December.

The Waterbury Electric Light Company has again increased the lighting capacity of its station, both for arc and incandescent lighting, several new Thomson-Houston dynamos and other apparatus having been recently put in.

Col. E. L. Dickenson, President of the Benedict & Burnham Manufacturing Company, is at the present time touring through the most attractive sections of Europe. During the Colonel's absence, which is set down for two months longer, the business cares and responsibilities of this great manufacturing concern fall upon the shoulders of Messrs. Frisbie and Hungerford, the former the son-in-law of Colonel Dickenson, and the latter for many years past the traveling representative of the company.

The Connecticut Mutual Boiler Inspection and Insurance Company, of this city, are not only fully organized and ready for business, but are prepared to make a very handsome showing of a list of prominent and wealthy manufacturers who have gladly come forward and indorsed this worthy enterprise by their approval and liberal patronage.

Waterbury has another new manufacturing enterprise, which has been named the Waterbury Electric Company, with Mr. E. S. Hayden as president and Mr. L. F. Burpee treasurer. It will enter principally into the manufacture of electrical apparatus; magnetos, motors and electric locks being the goods in this line the company intend to start in upon. A large and amply lighted building on Canal street has been leased, and it is now being equipped with various kinds of newly improved machinery. The gentlemen above named, who are the promoters, and who are at the head of this new company, are well known. The former is the junior member of the large manufacturing firm of Holmes, Booth & Haydens; the latter is one of the leading members of the Connecticut bar. W. I. B.

NORWICH, Conn., Aug. 20, 1886.

One of the most successful electric lighting stations of its size in New England is that of the Norwich Electric Light Company. Since the first week this company began burning its lights, and this has been only two months, orders for both arc and incandescent lamps have been steadily increasing, which clearly demonstrates the fact that the people of Norwich appreciate a good system of electric lighting, and have good sense enough to encourage the enterprise liberally. The officers of the company are as follows: Mr. H. H. Osgood, President; Mr. J. Hunt Smith, Secretary and Treasurer, and Mr. G. W. Phillips, Superintendent. The present lighting capacity of the station is 83 Thomson-Houston arc-lights and 600 Thomson-Houston incandescent lights. New foundations are being laid, and other preparations are under way for the early increase in equipment of the station. W. I. B.

LAWRENCE, Mass., August 21, 1886.

Mr. Wm. M. Brock, formerly identified with electric lighting and telephonic enterprises in Shamokin, Pa., has assumed the management of the Edison Electric & Illuminating Company of this city. Mr. Brock, although barely 25 years of age, enjoys an enviable reputation as an expert electrician and a reliable business man. He stands high in the esteem of the parent Edison Company, and has the friendship and respect of the large circle of electrical and scientific friends whom he left behind him in Pennsylvania.

Messrs. Augustus S. Bunker & Co., electricians, inventors and dealers in electrical supplies, No. 280 Common street, this city, report business as being very good in their line for this period of the year. W. I. B.

MANCHESTER, N. H., August 23, 1886.

A generous rivalry continues to manifest itself between the two electric lighting companies in this city; but there exists among the respective officers of both concerns a determination to outdo the other in giving satisfaction in the production of both arc and incandescent lighting. Able men constitute the officers of both the Ben Franklin Electric Light Company and Manchester Electric Light Company; and both corporations will exert every effort to gain a popular verdict from the public for the light.

The E. C. Forsaith Machine Company, of this city, reports business as very good in its line of machinery, engines, boilers, water-wheels, shafting, etc. This company has just made large shipments of machine tools to the United States Government Navy Yards at Norfolk, Va.; Washington, D. C.; Mare Island, Cal., and Brooklyn, N. Y., and has other orders in hand to follow. The company shipped last month twelve engine lathes to the Bridesburg Manufacturing Company, Philadelphia, Pa. The numerous orders being received from the United States Government by this company is alone ample evidence as to the quality of its manufactures.

The Franklin House, in this city, has shown a good example to the other hotels and also the public buildings of Manchester by the adoption of electric lighting. The proprietor has had the entire space running horizontally between the tops of the doorways and first floor windows filled in with 16 candle-power Edison incandescent lamps, which gives an attractive and brilliant effect at night. It is only just to say that the fittings and appointments of the interior of the hotel are unsurpassed by any other public house in New England. W. I. B.

PHILADELPHIA NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
PHILADELPHIA, August 23, 1886.

A meeting of the Board of Directors of the Globe Telephone Company was held in Philadelphia, last Thursday, for the purpose of deciding on the sale of territory to a syndicate of Western capitalists, who are said to offer $30,000 for the exclusive right to use the company's telephones in Illinois. The committee to whom the offer was referred reported that there were reasons why the company should hesitate to sell to any syndicate or company the exclusive privilege of using its telephones, the committee believing that it would be more advantageous to the company to retain full control of its telephones and simply allow sub-companies to be formed in various sections with the privilege to use the telephones on a royalty. The committee was continued, with instructions to report at a special meeting of the Board to be held at the call of the chair, the best plan to adopt in the matter. A statement as to the present condition of the company was made by David Humphreys, the Globe counsel. He reported that all the arrangements relating to the transfer of the claims of Antonio Meucci, of Staten Island, who is alleged to be the original inventor of the telephone, had been completed, and that the Globe Company now owned the Meucci inventions. It is hoped, he said, that Meucci's caveat, which was filed in the Patent Office originally in 1871, will be reinstated, which would give him priority over the patents of both Gray and Bell. Mr. Humphreys asserted that the Bell Company had failed to get an injunction against the Globe and Meucci, thus leaving the Globe Company in better condition than any other company in the country outside of Bell, and he strongly favored peddling territory in order that the company might get to work.

When the Edison Electric Light Company wired Christian street, in Lancaster, Pa., a number of very large poles were erected, almost blocking the thoroughfare. One of these was planted against the Central Carriage Factory building, at the corner of Grant street. The owner of the building objected to it, and last week workmen removed it and are now "putting up a pole in the air." Two heavy supports have been bolted to the building and to Huber's machine shop on the other corner, bridging Grant street These logs will be braced together and a pole run up from the centre over the street, to which arms for the wires will be attached.

CLEVELAND NOTES.

CLEVELAND, O., Aug. 23, 1886.

No city in the world devotes so much attention as Cleveland to the manufacture of carbons for electric lighting. This is owing to the fact that the material used can be so easily obtained there.

The Wallace carbons were probably the first made in this country. When the Brush Electric Company began manufacturing carbons, a little later than Mr. Wallace, Mr. W. H. Boulton was employed by that company in its carbon department. Mr. Boulton subsequently left the employ of the Brush Company, and, interesting capital, established a business for himself. This was the origin of the Boulton Carbon Company. Recently the members of the company did not work very harmoniously, and a short time ago Mr. Boulton sold out his interest in the Boulton Company, and established a business of his own. With the retirement of Mr. Boulton, the name of the company was changed from the Boulton Carbon Company to the National Carbon Company. Mr. Boulton's new company was at first called the Boulton Standard Carbon Company, but the name has just been changed to the one abandoned by the old company, and it is hereafter to be known as the Boulton Carbon Company. Mr. Boulton has been fortunate in securing a factory already built and excellently adapted for the manufacture of carbons at a price very much lower than he could have had a factory erected for. Being a pioneer in the carbon business, it did not take him long to get this factory under way, and he is already doing a business that keeps his factory running steadily all the time.

The National Carbon Company has the largest factory in the world devoted exclusively to carbons, and probably no other strictly carbon company does as much business. It is only a few weeks ago that the company made a single sale of a million carbons. The business of electric lighting is growing so rapidly that, notwithstanding its immense facilities, the National Company is unable to keep up with its orders. Mr. W. U. Masters, who has been so long connected with the National Carbon Company, still holds the position of president, while Mr. W. H. Lawrence, who was for many years prominently identified with the Brush Electric Company, and is therefore well known among electric light men, was the purchaser of Mr. Boulton's interest in the company, and is now the manager.

The Forest City Carbon Company is working on a little different line from that pursued by the other carbon companies. It is manufacturing not only solid, but also cored carbons, which seem to give excellent satisfaction wherever they are used. This company has introduced novel and ingenious machinery, by which it is enabled to expedite the manufacture of its carbons very materially. Mr. A. Pfannkuche, who is well known among electricians both in this country and in Europe, and who has given particlar attention to the subjects of electric lighting and carbons, is the electrician of the company. He has devoted much study to the best means of securing carbons of the highest efficiency. The carbons turned out by the company have certainly met with unquestionable success, for it has been found actually impossible to supply the demand. Additional machinery has been ordered, however, and it is hoped that in a short time the company will be so well up with its orders that it can fill the demand promptly. Mr. M. A. Devitt is the president, Mr.

H. C. Adams] the vice-president, and Mr A. Cowdrey, treasurer of this company.

The Crystal Carbon Company, whose works are situated on the corner of Scranton avenue and Fairfield street, and of which Mr. David A. Dangler, a well-known Cleveland manufacturer, is president; Mr. W. G. Smith, secretary and manager, and Mr. J. W. Valentine, general representative and salesman, has a nice plant, and makes, those connected with it think, carbons of a very excellent quality. Everything is now in perfect running order, and the company is anxious to have superintendents of electric light companies give its carbons a trial. Mr. Valentine was for many years connected with the Brush Electric Company, and in that capacity installed many electric light plants in different parts of the country. He is, therefore, well known among electric light men, and thoroughly conversant with what they need in the way of a carbon.

The "Forest City" has also given considerable attention to the subject of electric motors. The Cleveland Motor Company, manufacturing the Stockwell electric motor, is vigorously pushing its business of supplying the large and growing demand for small motors. Nearly 1,000 Stockwell motors are now in use, and as the officers of the company are recognized as among the most energetic and successful business men of the city, one can easily predict that ere long not one, but several thousand of these motors will be running. The regulator is an important adjunct to this motor, and the company claim that theirs is the only motor which can be regulated. The motor is manufactured in several sizes, from about one-quarter horse-power, suitable for running sewing machines, up to ten horse-power or even more. The Stockwell motor deserves the attention of those interested in motive power, and there are few electricians who are not.

The subject of dynamo oil has received some attention among the oil men of Cleveland. The Banner Oil Company, of which Mr. B. W. Housum is manager, and whose office is in the Atwater Building, are now manufacturing what they call their dynamo-machine oil, and which they claim to meet all the requirements for such an oil. They say it is in use by the electric light companies in Cleveland, and that it gives excellent satisfaction. They also say that they will be glad to send samples of it to superintendents wishing to test its qualities.

Mr. W. B. Cleveland is still paying special attention to the manufacture of electric-light apparatus, particularly his well-known switches. His business has increased very markedly within a few years, and the evidences of growing prosperity are apparent to all who visit his place.

The electric light plants here are doing well. The Brush station a model of its kind and has a capacity of 1,200 lamps. The Thomson-Houston plant is also doing very well, and more than upholds the reputation enjoyed by the system throughout the country.

The Brush Electric Company is working its factory "for all it is worth." It was already behind on orders, when dispatches came in from New York for the duplication of the plant lately destroyed there by fire. This will probably lead to a temporary disregard of the rule not to run the factory double time. The Brush people are said to be very particular about their work, and they make a point of keeping the supervision of the different parts of their apparatus in the hands of as few persons as possible. They object to running double shifts, believing that work is best done when a man puts in a good day's work and then quits, and is not hampered by somebody else taking up the work where he leaves off and finishing it. As a matter of fact, the reason why Brush apparatus lasts long and stands up well is that it is well made. In addition to its usual work, the factory is now engaged building the new Brush motors.

WESTERN NOTES.

KANSAS CITY, Mo., Aug. 21, 1886.

A new supply house has been started, known as the Southwestern Electrical Supply Company. Its offices are at 1304 St. Louis Avenue. On September 5, it will, according to its announcement, open a warehouse, and will there keep on hand ready for prompt shipment a remarkably large and complete stock of electrical goods, including wire, fixtures, tools, materials, poles, and the like. It will also carry a stock of the different brands of carbons and lamp globes, and will undertake to make direct and immediate shipment of engines, boilers, electrical machinery, beltings, lamps, test instruments, oils, and the like, from the manufacturers. The warehouse is near the freight depots, and the company claims to duplicate Chicago prices. The establishment of this concern is but another indication of the fact that Kansas City becomes more and more a distributing centre, and has tributary a very large region. The rapid growth of the telephone exchange in Kansas City, the success with electric lighting, and the increasing importance of the city in telegraphic service, all go to show that the city is a good place for an active supply concern to pitch its tent in.

CINCINNATI, O., Aug. 21, 1886.

Considerable attention has lately been arrested here by the gelatine battery made and controlled by the Cincinnati Electrical Company, 15 and 16 Glenn Building. This battery was invented and first used about a year ago. In its primitive form it was somewhat crude, but gave promise of much greater things than the company had expected. Mr. H. B. Cox, the electrician of the company, noticed one thing, and that was its slowness to polarize. He also observed that its resistance was somewhat reduced, instead of increased, as he had expected or feared it would be. He started to experiment with the same, and made, during his laboratory experiments, some 400 batteries. His desire was to make a battery that would have the following points: Slowness to polarize; strength, about 1½ volts; low resistance; no evaporation and no salts; and should be one which no amount of heat or cold could affect, and one which could be set up complete and shipped in that condition. In the "gelatine" battery he believes they have all of these points. Should the jar become accidentally broken, it does not in the slightest affect the working of the cell. Mr. Cox claims to be the first inventor of this style of battery, and thinks his claim a just one, for the reason that he has had a "gelatine" battery in use for the past eight months or more, and has been for that length of time working constantly to perfect and market it. "On ordinary open-circuit work," says Mr. Cox, "I judge the battery will last about ten years without *any attention whatever*. It has a carbon electrode with 48 square inches of surface and a drawn zinc electrode half an inch square, and the gelatine excitant can only be dried at an intense heat and that after repeated baking."

THE TELEGRAPH.

Signal Service Corps.—The New York Veteran Signal Corps Association was to hold its annual reunion at Brighton Beach Hotel, Coney Island, on Thursday, Aug. 26. All who ever served in the Signal Corps during the war were invited.

Found in New York.—Last March, John A. Hamley, manager of the United Lines Telegraph Company at Toledo O., disappeared. An examination of his accounts showed that in three months he had stolen $1,900, concealing the deficiency by false entries. For this he was indicted. Detective-Sergeant McCluskey, of this city, traced Hamley to No. 308 East Seventy-second street, where he lived with his wife and two children in straightened circumstances. He had been earning a few dollars a week as telegraph operator in a Wall street office. Hamley wept when arrested. He has been taken back to Toledo.

The Ownership of B. & M.—Col. Ingersoll and Mr. McClure appeared in Supreme Court Chambers last week to oppose a motion made by Roger Foster, as counsel for Benedict S. Wise, a holder of certificates issued by receivers of the Bankers & Merchants' Company, for leave to intervene in the previous motion for the purpose of showing that Mr. Stokes not only has no right to the securities he now claims, but that he ought never to have been allowed to get possession of any of the Bankers & Merchants' property, because the report of the referee who sold it has not yet been confirmed by the court. Mr. Foster held that the Farmers' Loan and Trust Company had been derelict in failing to present this to the court as an objection to Mr. Stokes' claims as a purchaser. Those claims were not well founded, he said, also because Mr. Stokes had only paid $50,000 in cash to the referee. The remainder of the purchase price he had made up with receivers' certificates, whose validity was at least doubtful. On the other side, it was contended that certificate holders had no right to intervene now.

THE TELEPHONE.

The Dynamophone.—The Chicago Dynamophone Company, formed by Mr. E. F. Lawrence and others, has a capital stock of $100,000.

Glen Cove, L. I.—A new telephone exchange is being built at Glen Cove, a place that has been greatly stimulated by the industries established there.

Far-Telephony in England.—Bath and Bristol have now been connected telephonically by Mr. H. F. Lewis, the manager at Bristol for the Western Counties & South Wales Telephone Company. Telephone talk has also been easily carried on between Bristol and London. The company contemplates circuiting Cardiff and Swansea with Bristol.

His First "Hello!"—It tells volumes as to the little use of the telephone in England, that last week Mr. Henry Irving, while at Narragansett Pier, used the telephone for the first time in his life. He was "called up" by an enterprising newspaper man, who coolly gave him instructions how to use the apparatus. Mr. Irving "soon got the hang of the idea, and his voice was very plain."

Brooklyn's Underground Wires.—The Brooklyn Electrical Subway Commission has laid 150 miles of wire, the cost of which has been $23,252.50. The New York and New Jersey Telephone Company has to bear most of this expense, and yesterday its share, $15,500, was paid. The balance is to be divided among the Western Union, Baltimore & Ohio, American District, and Brooklyn District Telegraph Companies. By the end of the year the commission expects to have planted 2000 miles of wire.

Providence, R. I.—In his news letter of August 16, Secretary Barney, of the National Telephone Exchange Association, says: "Connected with the central office of the Providence (R. I.) Telephone Exchange, there are 2,200 subscribers, besides about 1,000 more in branch offices. Since the establishment of the exchange, the method of calling for connections has been by subscribers' names instead of numbers, but this system having become too cumbersome for so large an office, numbers will be used after September next. The Providence Company operates about 2,500 miles of wire; pays quarterly dividends of five per cent., besides an occasional stock dividend, and its stock has recently sold at 130 on a par value of $50 per share. Altogether, it may be said that it lacks only "the one thing needful," viz.: a perpetual license from the American Bell Telephone Company."

THE ELECTRIC LIGHT.

Flushing, L. I., is to have a new electric light company.

Marion, Ind., will soon have an electric light plant.

Chester, Pa., is to have a new electric light company.

South Carolina.—The Charleston, S. C., Electric Light Company will operate 500 arc lights.

Chillicothe, O.—A contract for street lighting has been awarded to the Brush Company for five years.

Lansdale, Pa.—The Lansdale Electric Light Company has been incorporated with a capital stock of $10,000. Mr. S. Effing is the treasurer.

Malone, N. Y.—The Malone Electric Light and Power Company has a capital stock of $25,000. Mr. P. H. Shields is one of the incorporators.

Port Jervis, N. Y.—The Deerpark Electric Light Company has been organized and incorporated by Mr. G. M. Beebe and others, with a capital stock of $30,000.

The Wander & Abbott Illuminating Company, of Chicago, interested in electrical apparatus, has been formed by Mr. F. A. Wander and others, with a capital stock of $35,000.

Salina, Kan.—The Salina Gas and Electric Light Company has been incorporated with a capital of $60,000. Messrs. E. W. Pike, Chicago; H. C. Cross, P. M. Waymire and D. M. Davis, of Emporia, and Wm. Martindale, of Madison, Kan., are incorporators.

Council Bluffs, Ia.—The Jarvis Engineering Company, Boston, are setting a new tubular boiler for the Council Bluffs Electric Light Company, Council Bluffs, Ia., with the Jarvis furnace, to burn slack coal for fuel.

Abilene, Kan.—The Jarvis Engineering Company, Boston, Mass., have received the contract to set four tubular boilers with the Jarvis patent boiler setting and National rocking grates to burn screenings, for the Abilene Electric Light Company.

The United States Company is now paying special attention to central station work, with good results. It reports great activity, and has to meet a new demand for plant from gas companies that have made up their mind to enter the electric lighting field.

Paris, Tex.—Mr. S. J. Wright, President of the Paris Gas Company, of Paris, Tex., is investigating the subject of electric lighting, with a view to the introduction of some improved system in connection with the regular gas lighting service of the company.

Charlestown, Mass.—The Charlestown Gas and Electric Light Company have received their Armington and Sims engine, and their new steel boiler is being set with the Jarvis boiler setting, using Sheffield grate bars. They will use for fuel, coke, screenings and railroad cinders.

Waltham, Mass.—The directors of the Waltham Gas and Electric Lighting Company met last week, and rejected a proposition for consolidating with the Waltham Electric Lighting Company. A new plan of union was approved, and if this is not accepted by the other company, the board will put in an electric plant without delay.

The American Electric Manufacturing Company will have in its new working quarters one of the finest factories in the country. It will have a capacity of from 600 to 800 men and a floor space of 320,000 square feet. It is said that it will be the largest establishment of the kind in the United States. The cost, with machinery, runs up to about $200,000.

Montreal.—There is a disagreement between the Montreal Gas Company and the city corporation. It appears, says *Light, Heat and Power*, that the electric arcs have been introduced in some of the streets in a manner that the gas company considers irregular, and it is still furnishing gas-light along these streets. The city authorities say that this gas will not be paid for. Under its contract, the gas company lights nearly 3,000 public lamps, at $20 each per year. Gas is $1.50 at Montreal.

APPLICATIONS OF POWER.

Port Huron, Mich.—The Port Huron Electric Railway Company has been incorporated by Mr. Wm. F. Botsford and others, with a capital stock of $25,000.

Printing Presses.—C. A. Heyer & Son, printers, Boston, make a special note on their business cards that their presses are run by Sprague motors, and they invite their customers to "call and view."

Stockwell Motors are in brisk demand. Nearly a thousand of them are now in use, and the Cleveland Electric Motor Company, of Cleveland, O., has to keep running steadily to fill new orders from all parts of the country.

New Bedford, Mass.—The local Edison Company has seven Sprague motors on various work, earning nearly $40 a month, on ice-cream freezers, hair-picking machines, bookbinders' cutting presses, hydro-extractors in dye-works, etc.

Pittsburgh, Pa.—The Allegheny County Light Company has had very good results in the motor line so far, on a small scale, and is going into the business more extensively. It has tried both arc and incandescent circuits with success, but finds the incandescent best.

Philadelphia, Pa.—Mr. H. M. Schlesinger, electrician of the Ridge Avenue Electric Railway, called at THE ELECTRICAL WORLD office this week. He is well satisfied with the experience and results gained on the road, which is now working smoothly and regularly, and seems likely to be a pattern for many others. Mr. Schlesinger is a young and able German electrical engineer, of whom it is easy to believe great things.

The Julien Electric Company of New York has been organized for the purpose of equipping railway and street cars with storage batteries for lighting and propelling purposes. The officers of the company are: Wm. Bracken, President; Richard Peters, Jr., Vice-President; Pedro G. Salom, Secretary; and Thomas Frazer, Electrical Engineer; Henry G. Morris, Mechanical Engineer. Most of these gentlemen are well known in mechanical and engineering circles.

In a Machine Shop.—Mr. E. B. Stimpson, of Spruce street, this city, the well-known manufacturer of dies, punches, embossers and fine machinery for shoe factories, is running four floors with a Daft motor, which is set right alongside the old disused engine and boiler. Mr. Stimpson has now had electric power for eight or more months, without interruption, finds it steady, clean, cheap and satisfactory, and is enthusiastic in his praise. Just across the way from his workshops, Daft motors are running two elevators.

Cheyenne, Wyo.—Mr. E. P. Roberts, manager of the local Brush-Swan Company, has a 1½ horse-power motor, home-made, running a printing press for an evening paper. The press was hitherto run by hand for 1¼ hours, and the man power cost $1 per day. The paper has bought the motor for $200, pays 30 cents a day for current, and gets a neat edition out on the street half an hour earlier. The motor is run on an incandescent circuit, by storage during the day and by dynamo at night. Another motor, same size, runs a gunsmith's lathe and emery grinder, and others are running sausage machines for butchers. Mr. Roberts finds the business growing and has several new motors in course of construction.

The Toronto Exhibition Electric Railway.—The new locomotive for the electric railroad now being constructed in the shops of the Toronto Electric Light Company will be ready for a trial trip in the early part of next week. It is expected to develop about 40 horse-power, and is entirely novel in construction and design. It is altogether the work of the company's electrician

and mechanics, and the first of any kind constructed in Canada. The entire operations of the railroad, hauling the cars, stopping, starting, applying the brakes, illuminating the headlight and ringing the bell will all be performed by electricity manipulated by switch levers on the forward part of the motor car. A current of electricity of sufficient power to accomplish this work will be generated by apparatus placed in Machinery Hall and driven by an automatic steam engine owned by the association. Neither time nor expense is being spared to make this the most complete and interesting exhibition of what can be accomplished by means of electricity.—*Toronto Globe.*

PERSONALS.

Col. Bullock, of Cincinnati, is at the head of a large syndicate that has invested in land at Watch Hill, R. I., to be laid out as a select seaside resort.

Mr. Wm. Hubbard, the inventor of the Elgin telephone and other devices, has a new talking instrument, patented Aug. 19. He calls it the "Ethel May Hubbard."

Mr. Wm. J. Hammer, formerly chief inspector of central stations for the Edison Electric Light Company, has accepted the management of the Edison Electric Illuminating Company of Boston.

Mr. John F. Noonan, of Paterson, the chairman of the Transportation Committee of the National Electric Light Association, has, we regret to hear, sustained a severe loss in the death of a sister.

Mr. E. H. Johnson, the President of the Edison Company, is said to have been investing in highly desirable real estate at Greenwich, Conn., where he will now have his permanent summer residence.

Mr. A. H. Hayward, who operated the Daft road at New Orleans, and has had charge of the Daft street railway at Baltimore, has gone to Los Angeles to install a Daft plant there for electric street railway purposes.

A. W. Prentice & Co., of Norwich, Conn., have been awarded the contract to wire the Sturtevant House, in New York, for electric apparatus. The firm successfully competed with firms in New York and Boston.

Mrs. Cleveland, from the North Woods, N. Y., opened the Minneapolis Exhibition by telegraph, on the 23d inst., her touch on the key in the Adirondacks—where she and the President are enjoying a holiday—starting the machinery hundreds of miles away.

Secretary Barney, of the National Telephone Exchange Association, is about to compile and will publish for general information a directory list of the officers of all the telephone companies in the United States. We bespeak for him all the help our readers can give.

Mr. Theodore N. Vail.—A special dispatch from London says: Mr. Theodore N. Vail, formerly General Manager of the Bell Telephone Company, is here on important business connected with a telephone project in South America. He will sail for New York on Aug. 28, and is understood to have been entirely successful in his efforts among capitalists here.

Ex-Governor Howard.—On Tuesday evening Ex-Governor Howard and wife gave a sheet and pillowcase party at their spacious home on the hill, Silver Spring. Soon after 8 o'clock white-robed spectral figures suddenly appeared from every direction, and in one or two instances parties as suddenly disappeared on their approach. Some fifty young people, in costume, participated, and were royally entertained. The grounds were illuminated with lanterns, and the drives and lawn proved a charming promenade.—*Providence Journal.*

Mr. M. D. Cook, who lives near Mansfield, O., claims to have invented the long-sought-for perpetual motion machine. It is an electrical contrivance, which "propels itself by its own current and requires only one-tenth of its power to keep itself running, leaving the remaining nine-tenths as a motive power for any machinery to which it may be attached. Mr. Cook claims that his electric engine will never stop except by the wearing away of its own parts, and that it can be utilized for lighting and heating purposes at the same time that it is used for power."

Mr. Maurice B. Flynn says about the Electrical Subway business: "The whole basis of the statements that I am interested in it comes from the fact that my father-in-law is one of the Commsssioners. I had nothing to do with his appointment. I was in Europe at the time, and had been for two months. In fact, the bill did not become a law until weeks after my departure. Because Mr. Moss is my father-in-law the *Times* charged me with controlling the Commission, and every inventor or patentee who was anxious to secure the adoption of his patent by the Commission came to me and invoked my assistance. I refused to participate in any way, and because I declined to become interested in their schemes the several promoters now assert that I was interested in those of somebody else. I never spoke to Mr. Loew or to Mr. Hess or to Mr. Flower on the subject of their selection of any system, nor have I ever attempted to influence the opinion of Mr. Moss on the subject."

MISCELLANEOUS NOTES.

The Electric Mail Box Company, of Chicago, Ill., has a capital of $50,000. Mr. F. W. Carey is one of the incorporators.

Electricity at the Ecole Centrale.—The subject of the theme set the pupils of the Ecole Centrale for the end of the scholastic year is, "The utilization of a water-fall equal to 300 horse-power for the public and private lighting of a town."

Tuck's Submarine Boat made a successful trip on the Hudson on the 24th, remaining under water seven minutes at a time, and illustrating the ease with which cartridges of dynamite or torpedoes, etc., can be fired under a ship by electricity.

Atmospheric Electricity.—The *English Mechanic* gives some of the results obtained by Prof. Palmieri, of the Vesuvian Observatory. He finds that there is a maximum of atmospheric electricity at 9 A. M., and another soon after sunset; a minimum occurs before daybreak and another in the afternoon. This periodicity is, however, disturbed by atmospheric movements. The assumption that atmospheric electricity becomes stronger with altitude is not borne out by the Vesuvian observations.

What is Electricity?—Professor Corguillé answers this question in the following manner in the *Moniteur Industrielle:* "Electricity may be considered as the whole range of phenomena which arise from the condensation, the rarefaction, or the movement of the ether either around or in the interior of masses of matter. But inasmuch as any movement of the ether necessarily implies both rarefaction and condensation, the above proposition in reality attributes the phenomena of electricity to one unique, primordial cause—a variation of the normal force of elasticity of the ether at any point."

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Western Union, b 65¾, a 66.

Telephone.—Am. Bell, b 189, a 190; Erie, b 26, a 26½ New England, b 39¼, a 39½.

Electric Light.—No new quotations.

BUSINESS NOTICES.

E. P. Allis & Co., Reliance Works, Milwaukee, Wis., have issued a very fine catalogue of 258 pages, of flour mill supplies and machinery, engines, etc. Several portions are of interest to electrical men, for many of whom the concern has already done highly satisfactory work. Descriptions, illustrations and prices are given of Reynolds-Corliss engines, Risdon water-wheels, Leffel wheels, belting, lubricators, friction clutches, blower and exhaust fans, boiler feed pumps, and a great variety of other appliances and apparatus. The firm has evidently won for itself a front place in the machinery business of the West.

Non-Magnetizable Watches.—The Waterbury watch is now in very general use among practicing electricians on account of its insensibility to magnetic influence. The Waterbury Company has now reached its series E, and says: "With each series the time-keeping qualities of the watch have been improved. Series E takes the place of series C, which we discontinue manufacturing; it is the result of over 5 years' experience in this particular line. The improvement in the general appearance (including large dial) of this new watch commends itself to the trade."

Anti-Magnetic Shields.—Messrs. Giles Bro. & Co., Chicago, Ill.: Gentlemen: Your Anti-Magnetic Shield for Watches cannot be overestimated. It is now very near eight months that I have worn my watch, and to-day it is, without ever correcting time, about one minute slow. Considering the fact that I am every day near Dynamo-Electric Machines in our regular business, the test could not be harder. I could never have believed that the protection was so complete.

In this age of electricity, not only electricians, but every one who needs correct time, should have the Anti-Magnetic Shield. A good deal of practical utility, as well as pleasure, can be derived from a good time-keeper. At present I look upon a watch without a shield as a thing incomplete; and so it is.

Very respectfully, CHAS. J. VAN DEPOELE,
Electrician V. D. P. E. M. Co.

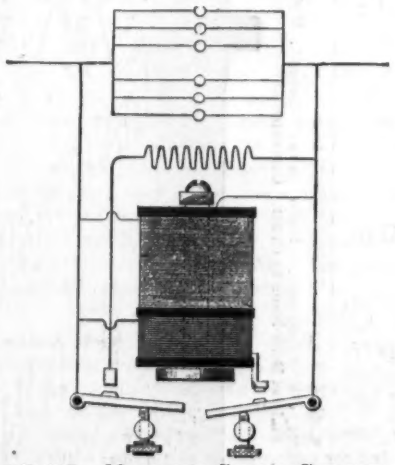
Address GILES BRO. & Co., for particulars, prices, etc.

Electric Water-Wheel Governor.—Mr. C. W. Harvey, of Waterloo, Ia., writes thus to Mr. H. A. Streeter, of the Globe Iron & Electric Engineering Works of Chicago: "Some four years ago I bought a Brush dynamo also a dial for its regulation. After using the same for two years I was advised by an old electrician to get the Amet governor for my water-wheel and do away with the dial, which I did. This governor has given satisfaction, so much so that when I bought my second dynamo a short time ago I needed no advice as to what I most wanted, but gave my order for a second governor. This should be proof enough of itself as to how I like it. We can turn on water enough to just start the wheel and run one light, when we may turn on all of the forty-five lights, one by one, and the governor will raise the gate sufficient to run them. When we commence to turn off the lights the governor feels it at once, and at the speed of lightning turns off the water just as rapidly as required. I should hate to be without them. I now at this writing have sixty arc lamps, and shall soon have 150 incandescent lamps running and being governed by the Amet governor."

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED AUGUST 10, 1886.

346,029. Locking and Releasing Mechanism for Locks; William C. Fisher, Boston, Mass. The invention has for its object to provide the lock with mechanism for locking the slide-bolt, so as to prevent the same from being retracted by the outside knob. The retaining device for locking the detent-lever in position, to prevent the movement of its tumbler, consists of a pivoted lever, which also serves as the armature of an electro-magnet located within the lock, said armature or retaining device being controlled to thereby release the lever by the electro-magnet at the will of the person in attendance within the building.



347,025. MULTIPLE SERIES CUT-OUT.

346,902. Pneumatic and Electric Railway; Ellis F. Edgar, Woodbridge, N. J. In an air-tight tunnel is provided a series of electrical tracks for automatically starting and stopping trains.

346,930. Telegraph Key; Robert A. MacCready, New York, N. Y. Consists of a tongue having a knob of insulating material rigidly fixed to one end thereof. The knob is provided with a square perforation, through which a corresponding-shaped shank of a secondary knob plays. The shank, in its normal condition, extends a trifle below the aforesaid tongue, and is provided with a platinum wire or strip forming one pole of the instrument, said wire or strip adapted to rest in contact with points of a corresponding metal secured to the under side of the aforesaid tongue, forming the other pole.

346,912. Splice for Underground Cables; William R. Patterson, Chicago, Ill. Assignor to the Western Electric Company, of same place. Relates to an improvement upon his patent 277,335, of May 8, 1883.

346,957. Electrical Meter; William L. Stevens, Dorchester, Mass. Consists of an intermittently-operating registering mechanism, the extent of movement of which is regulated by the position or condition of the current-indicator.

346,962. Telephone Receiver; William C. Turnbull, Baltimore, Md. The object of the invention is to improve the construction and operation of telephonic receivers; and to this end it consists in employing a vibrating plate, perferably rectangular, and sustained at two opposite edges only, preferably under tension, and suitable magnets.

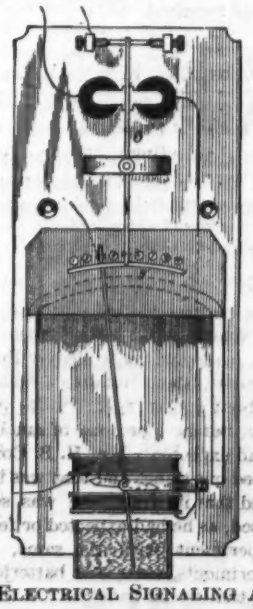
346,963. Automatic Suspended Switching Device for Electric Railways; Charles J. Vandepoele, Chicago, Ill. The invention relates to improvements in electric railways of the class in which a suspended conductor and a traveling contact dragged therealong by the car, and having branch tracks or switches, form essential features; and it consists in such construction of the traveling contact and arrangement of the switch so that the said carriage will be automatically controlled and directed in its course along the conductors in a prearranged manner.

346,965. Armature for Dynamo-Electric Machines; Ernest P. Warner, Chicago, Ill., Assignor to the Western Electric Co., of same place. The parts are so arranged that the space directly opposite the one which includes the whole of any given coil does not include any of the convolutions of said given coil, but the convolutions are divided half and half between the spaces on each side of the space which is diametrically opposite the space containing all the convolutions.

346,970. Electrical Device for Synchronizing Clock Pendulums; Harold Whiting, Cambridge, Mass. Similar to patent 11,723, of Sept. 26, 1854, with this important difference: The mechanism has been so constructed that the vibrations of the pendulum control the interruptions of the electric current, and not the interruptions of the current the vibrations of the pendulum. The maintenance of the motion has been the sole object, and the mechanism has been arranged so as to eliminate any possible effect of the electricity in accelerating or retarding the pendulum, and hence, without essential modification, such apparatus is incapable of acting as a control.

346,971, 346,972. Telegraph Insulators; John Wilson, New York, N. Y. (1) A spout or drain is provided in combination with the usual groove for holding the wire, so that rain water will be carried off. (2) He combines a novel form of binding screw with the first invention.

346,990. Electrical Conductor; Joseph R. Finney, Pittsburgh, Pa., Assignor of one-half to Thomas B. Kerr, Allegheny, Pa. The conductor has a vertical web and laterally projecting flanges and a bifurcated traveler mounted on and straddling the flanges of the conductor; the advantages being that the conductor can be made of any desired size without requiring a material change in the traveler, and that the traveler cannot leave the conductor accidentally.



347,097. ELECTRICAL SIGNALING APPARATUS.

347,013. Electric Fuse for Blasting; Jean P. A. Scola, Paris, France. Consists in a change of disposition of the usual parts.

347,023. Spongy-Carbon Battery; Emile Berliner, Washington, D. C. Consists in making battery carbons porous by partially consuming them in the open air.

347,025. Multiple Series Cut-out; Charles F. Brush, Cleveland, O. It is claimed that the objection to the usual system is, that it does not provide a complete and safe short circuit for the main current, should the majority of the electro-receptive

devices be inoperative. This invention overcomes the difficulty by means of mechanism similar to that shown in the accompanying cut.

347,038. Automatic Electric Barrel Register; George W. Hey, Syracuse, Assignor of one-half to Matthew J. Dolphin, Brooklyn, N. Y. He combines a way supporting the article to be registered, electric circuit closers located in said way, whereby the circuit may be closed by the article in transit, a register for indicating the number of articles passed over said way and a suitable electric motor.

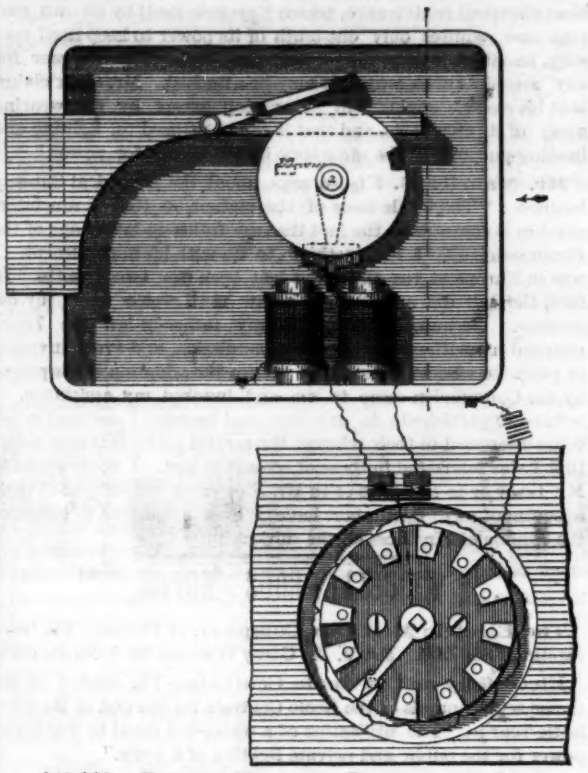
347,068, 347,069, 347,070, 347,071. Electro-Magnetic Locks; Frederick Sedgwick, Cincinnati, O., Assignor of the first patent, 347,068, to John H. Purdy, Chicago, Ill. 1. He claims, principally, the combination, with a combination-lock arranged within a safe or other secure receptacle, of a series of electro-magnets having suitable electrical connections from without, an electro-generator and switching device whereby said magnets may be excited from without the safe, and an armature actuated thereby for imparting motion to the tumblers of said lock. The disposition is shown in the cut. 2 and 3. Relate to improvements upon the above patent. 4. Consists in connecting with the lock and bolt-moving device an auxiliary mechanism which may be employed by electrical means from without the safe to retract the bolt-work in the event of the failure of the compressed air to effect the desired result, said auxiliary mechanism being rendered inoperative by blocking the same or breaking the circuit therewith at all times except when the lock-bolt is retracted.

347,075. Electro-Magnetic Car Brake; Illius A. Timmis and George Forbes, London, England. Consists in the provision of an electric magnetic car brake wherein an electro-magnet of annular form is arranged in juxtaposition to a disc or wheel fixed on a revolving shaft whereby when said electro-magnet is energized its attraction for the wheel or disc will tend to brake or stop the same.

347,097. Electrical Signaling Apparatus; Thomas A. Edison, Menlo Park, N. J. Embraces a circuit controller, which consists of two contacts, a galvanometer arm adapted to enter between said contacts and means for forcing the contacts together upon said arm, as shown in the cut, the object being to provide means by which signals of any character may be communicated from a central office or other place to any one of a number of receiving or indicating instruments on the same line without affecting any of the other instruments.

347,120. Rheostat; Richard H. Mather, Windsor, Conn. The object is to combine a set of resistance-coils, and an index-plate or face-plate, indicating the absolute resistance of such coils, with convenient mechanism for the manipulation of said coils, in such a manner that the resistance introduced at any time into an electric circuit by the use of the improved rheostat shall be correctly indicated by the figure visible by the observer, while all other index-figures shall be hidden from view.

347,140, 347,141, 347,142. Electric Welding and Apparatus for Electric Welding; Elihu Thomson, Lynn, Mass. In the first an electric current and a gas flame are



347,068.—ELECTRO-MAGNETIC PERMUTATION LOCK.

simultaneously applied to the parts to be welded. The others relate to apparatus for carrying out the process. See article.

347,164. Manufacture of Incandescents; Alexander de Lodyguine, Paris, France. He treats the organic matter, before carbonization, with boric fluoride.

347,204. Regulator for Dynamo-Electric Machines; Sidney H. Short, Denver, Col., Assignor, to the United States Electric Light Co., of same place. Consists in connecting with the terminals of the field-magnet wire of the dynamo, an automatic shunting device which will regulate the amount of current flowing through the field-magnets, thereby regulating the electromotive force of the dynamo, and also the current flowing through the external resistance.

347,218. Carbon Holder for Arc Lamps; David Williamson, Hartford, Conn. The invention is a device for adjusting the carbons, and it consists of an adjustable ball-and-socket joint between the carbon and the carbon-rod or other support of the carbon-holder.

347,231. Secondary Electric Battery; Achilles de Khotinsky, Rotterdam, Netherlands. The battery is built up of shallow trays lined with bitumen and sheet-lead, and these trays contain shallow troughs of insulating material containing skeleton metallic frames surrounded by an exciting liquid.

347,247. Process of and Apparatus for Making Arc Lamp Carbons; John T. Lister, Cleveland, O. The leading features consist: 1. In removing the carbons from the mold while in a warm or pliable state to a channeled and grooved platform, and then passing the platform, with the carbons, beneath cutters to cut the webs. 2. In forming the point while the carbon is warm and pliable. 3. In taking the carbon while in a warm and pliable state and exposing its end to the point-forming mechanism.

347,256. Electrotype Registering Machine; Anthony O. Russell, Cincinnati, O. Consists of details of mechanical construction.

347,258. Electric Battery. 347,259. Electric Battery Element or Electrode; Eli T. Starr, Philadelphia, Pa., Assignor, by direct and mesne assignments, to the Starr Electric Storage Company, Camden, N. J. 1. The electrodes are bound together by clamping devices upon, and have their opposing faces separated by, an interposed non-conducting separator which extends below said plates or electrodes and insulates the same from the bottom of the battery-vessel. 2. The mechanical construction is shown in the cut. It consists of finely divided material inclosed in a frame, the material being pressed tightly within the frame.

347,300. Secondary Electric Battery; Edmond Julien, Brussels, Belgium. The electrodes consist of lead, antimony and mercury, and the active material consists of a metallic salt.

Copies of the specifications and drawings complete of any of the patents mentioned in this record—or of any other patent issued since 1866—can be had from this office for 25 cents. Give the date and number of patent desired, and address Johnston's Patent Agency, Potter Building, New York.

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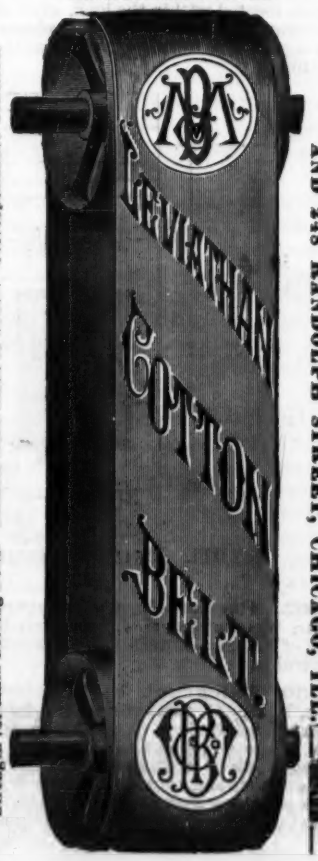

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